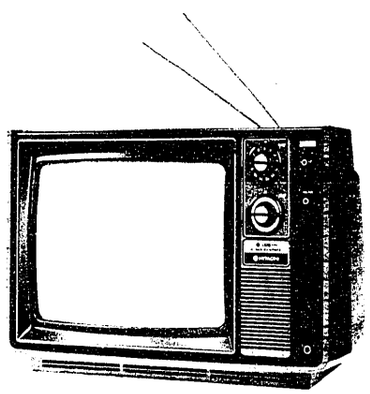
HITACHI

CR-316
CR-320

SERVICE MANUAL No.326 NP5A2X Chassis

CAUTION:
Before servicing this chassis, it is important that the service technician read the "Safety Precaution" and "Product Safety Notices" in this Service Manual.



CR-320

CONTENTS

SPECIFICATIONS 1
SEFETY PRECAUTIONS 2
PRODUCT SAFETY NOTICE 3
TECHNICAL FEATURES 4
CONTROLS 4
TECHNICAL CAUTIONS 5
INSTALLATION AND ALIGNMENT 8
PRINTED WIRING BOARD, CIRCUIT 15
TUNER CIRCUIT SCHEMATIC DIAGRAM 20
BASIC CIRCUIT SCHEMATIC DIAGRAM 21
REPLACEMENT PARTS LIST 22

TECHNICAL SPECIFICATIONS

ANTENNA INPUT IMPEDANCE .... 300 ohm balanced
75 ohm (for Coaxial Cable)
TELEVISION R-F FREQUENCY RANGE
All 12 VHF Channels ..... 54 MHz to 88 MHz
174 MHz to 216 MHz
All 70 UHF Channels ..... 470 MHz to 890 MHz
INTERMEDIATE FREQUENCIES
Picture I-F Carrier Frequency ..... 45.75 MHz
Sound I-F Carrier Frequency ..... 41.25 MHz
Color I-F Frequency ..... 42.17 MHz (nominal)
Sound I-F Frequency ..... 4.5 MHz
Color Sub-Carrier Frequency ..... 3.58 MHz
POWER INPUT ..... 120 volts, 60 Hz
POWER RATING 80W
CONVERGENCE ..... Self convergence
FOCUS ..... Electrostatic
PICTURE TUBE 370CFB22

SOLID STATE COLOUR TELEVISION

July 1976

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis or picture tube.

WARNING: Since the chassis of this receiver is connected to one side of AC power supply during operation, whenever the receiver is plugged in, service should not be attempted by anyone unfamiliar with the precautions necessary when working on this type of receiver.

The following precautions should be observed:

1. Do not install, remove, or handle the picture tube in any manner unless shatterproof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling.
2. When service is required, an isolation transformer should be inserted between power line and the receiver before any service is performed on a "HOT" chassis receiver.
3. When replacing a chassis in the receiver, all the protective devices are put back in place, such as; barriers, non-metallic knobs, adjustment and compartment cover-shields, isolation resistor-capacitor, etc.
4. When service is required, observe the original lead dress. Extra precaution should be taken to assure correct lead dress in the high voltage circuitry area.
5. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacture's. Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
6. Before returning a serviced receiver to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the receiver by the manufacturer has become defective, or inadvertently defeated during servicing.

Therefore, the following checks are recommended for the continued protection of the customer and service technician.

Leakage Current Cold Check

With the AC plug removed from the 120V AC 60Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC 500V), connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 0.3MΩ and a maximum resistance reading of 4MΩ. Any resistance value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a 120V AC 60Hz outlet (do not use an isolation transformer for this check). Turn the AC power switch on. Using a "leakage Current Tester", measure for current from all exposed metal parts of the cabinet (antennas, screwheads, metal overlays, control shaft, etc.), particularly any exposed metal part having a return path to the chassis, to a known earth ground (water pipe, conduit, etc.). Any current measured must not exceed 0.5mA.

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE RECEIVER TO THE CUSTOMER.

High Voltage

This receiver is provided with a hold down circuit for clearly indicating that voltage has increased in excess of a predetermined value. Comply with all notes described in this Service Manual regarding this hold down circuit when servicing, so that this hold down circuit may correctly be operated.

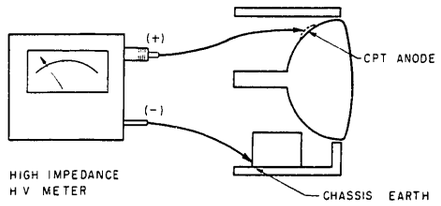
Serviceman warning

With minimum brightness and Contrast, operating high voltage in this receiver is lower than 25.0KV. In case that components having any influence upon high voltage is replaced, confirm that high voltage with minimum brightness and Contrast is lower than 25.0KV. (if the high voltage is higher than 25.0KV, reconnect size adjustment 1P plug in POWER/DEF. PWB. from S terminal to M terminal or from M to L terminal and reconfirm that the high voltage is lower than 25.0KV.)

(components influencing the high voltage)

C716	C718	C720	C728	C743	R710
C717	C719	C721	C729	FBT	R711
		M901		DY	R732

To measure H.V. use a high impedance H.V. meter. Connect (−) to chassis earth and (+) to the CPT anode button. (See the following connection diagram).



Connection diagram of H.V. meter

NOTE: Turn power switch off without fail before the connection with Anode button is made.

X-Ray Radiation

TUBE: The primary source of X-Ray radiation in this receiver is the picture tube. The tube utilized for the above mentioned function in this chassis is specially constructed to limit X-RAY radiation emissions.

For continued X-RAY radiation protection, the replacement tube must be the same type as the original, HITACHI approved type.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in HITACHI television receiver have special safetyrelated characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by shading on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, X-Ray radiation, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies of, HITACHI Service Manual may be obtained at a nominal charge from your HITACHI SALES CORPORATION.

TECHNICAL FEATURES

1. ALL TRANSISTORIZED CIRCUIT

HITACHI transistor television has always taken the lead in black and white TV and established its high reliability in the market.

With this experience of solid state technology and the developments of color television skill, HITACHI present the finest color television in the solid state world.

2. NEW COLOR PICTURE TUBE

New HITACHI KEYED-O-LINE color tube has been developed with high-precision technology and skill. Precision gun, whose grids are unitized in a one piece, incorporates large-diameter lens in a narrow neck picture tube.

This picture tube presents a crisp (with its unitized gun and large lenses.), and bright picture.

3. QUICK START CPT

Quick start CPT succeeds "QUICK START" feature without preheating method. After turning on the mains switch, the picture comes out in five seconds.

4. HIGH QUALITY CIRCUITS

a. Newly designed scanning system and thoroughly studied circuitry produce the beautiful picture and minimize the geometrical picture distortion.

b. Cathode drive circuit by primary color (R.G.B.) signals assure fine picture.

c. High-performance AGC circuit and noise canceller circuit need no adjustment against a change of field strength. Furthermore, these circuits stabilize the receiver under the most difficult reception conditions and minimize aeroplane flutter and signal fading.

5. HIGH RELIABILITY

Highly-printed circuits, stabilized power supply, and various protection circuits assures highly reliable receiver performance.

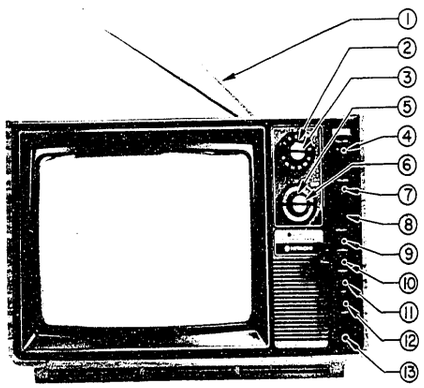
6. AUTOMATIC DEGAUSSING

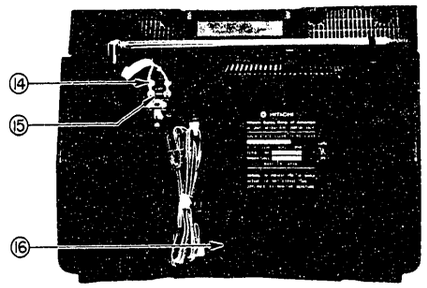
This receiver is equipped with an automatic degaussing coil which effectively demagnetizes the picture tube each time the receiver is turned "ON".

7. LOW POWER CONSUMPTION

Power consumption is only 80 watts.

CONTROLS





1. TELESCOPIC ANTENNA
2. PUSH FOR VHF PRE-SET FINE TUNING
3. VHF CHANNEL SELECTOR
4. PULL-ON SWITCH
5. PUSH FOR UHF FINE TUNING
6. UHF CHANNEL SELECTOR
7. VOLUME CONTROL
8. APS/AFC SWITCH
9. CONTRAST
10. BRIGHTNESS
11. COLOR
12. TINT
13. EARPHONE & RECORDING JACK
14. UHF ANTEENA TERMINAL
15. VHF ANTENNA TERMINAL
16. H. HOLD

TECHNICAL CAUTIONS

1. POWER SUPPLY CIRCUIT

The power supply circuit uses the phase angle control system and the constant voltage circuit system, basically similar to that used in NP4SX but more simplified in circuit configuration. This power supply circuit has the following outstanding features.

1) The control range is wide.
2) Power loss is smaller in the power supply circuit and the reliability is so much higher.
3) Even if there occurred any load short circuits as the short circuiting of the horizontal output transistor, it causes no chain breakdown.
4) Since no transformer is used, the power loss is so much smaller and less in weight.
5) The use of the voltage setting module in the error detection section has eliminated the necessity of voltage adjustment.

[CIRCUIT OPERATION]

The circuit diagram is shown in Fig. 1. This power supply circuit consists of the phase angle control section and the series-type constant voltage control section.

1) Phase Angle Control Section

The phase control transistors TR903 and TR904 form a differential amplifier and have such a switching characteristic that the one with a higher base voltage than the other's is switched off and oppositely the other with a lower base voltage is switched on. A reference voltage of 0V is applied to the base of TR904 through R913, R921 and R926, while the voltage across the smoothing condenser C908 divided between R907 and R908 is applied to the base of TR903.

To make it easier to understand, it will be explained about the circuit operation on direct current. Now suppose that the voltage across the smoothing condenser C908 has increased. The base voltage of TR904 will be larger than that of TR903 and then TR904 will be "OFF". As a result, there will be no current flowing to the gate of TR901 (SCR) and TR901 will be "OFF". On the other hand, if the voltage across the smoothing condenser has lowered. TR904 will be "ON" and a gate current will flow so that TR901 will be "ON" and operate to increase the voltage across C908.

In actuality the AC signal that is generated by the integration circuit of C905, C906, C907, R909 and R925 is superimposed on the DC signal so that the conduction angle may be changed as to maintain the voltage across the smoothing condenser C908 at a constant level. That is to say that if the voltage across the smoothing condenser C908 increases, the conduction angle of TR901 is narrowed to allow a smaller charging current to flow. However, if the voltage across the smoothing condenser C908 decreases, the conduction angle of TR901 become wider to permit a larger charging current to flow. This is the way the voltage across C908 remains constant.

In this way, the phase control section functions to keep the voltage across the smoothing condenser C908 constant at all times irrespective of the variations of the AC input voltage and load current.

2) Series Type Const-Voltage Control Section

This is similar in circuit configuration to the series type constant-voltage control system previously in use.

NP5A2X chassis uses the voltage setting module M901 in its error detection section so that it eliminates the necessity of output voltage adjustment.

The specified +B voltage can be obtained by connecting the resistor R930 in parallel between the terminal ③ and ⑤.

The tolerance of R930 has little effect on +B voltage variation.

Caution; never disassemble M901 but exchange M901 all at once when you replace M901.

3) Load Short Circuit

If the load is short-circuited, TR907 and TR905 will be "OFF" and the electric charge of the smoothing condenser C908 is discharged through R916. On the other hand, in the phase control section, TR904 and TR901 become "OFF" and C908 is charged through large resistance of R929. Since R916 is smaller than R929, the voltage of the smoothing condenser C908 drops below 30V so that R916 will not be heated abnormally.

[TROUBLE SHOOTING]

First, take the following steps to check to see if the series type constant voltage control section is working properly.

1) Set AC input power supply to 100 – 105V.
2) Make short-circuit R920 (across the anode and the cathode of TR901).
3) Switch on the power supply.
4) Check to see if the output voltage (+B voltage) has a normal value (+110V ±3V).

Judgement: If the output voltage has a noraml value, the trouble is likely to be located in the phase angle control section. Remove the short circuit in Step 2 above and proceed to check the phase angle control section.

If the output voltage is found abnormal, the trouble is likely to a fault in the constant voltage control section or a load short circuit.

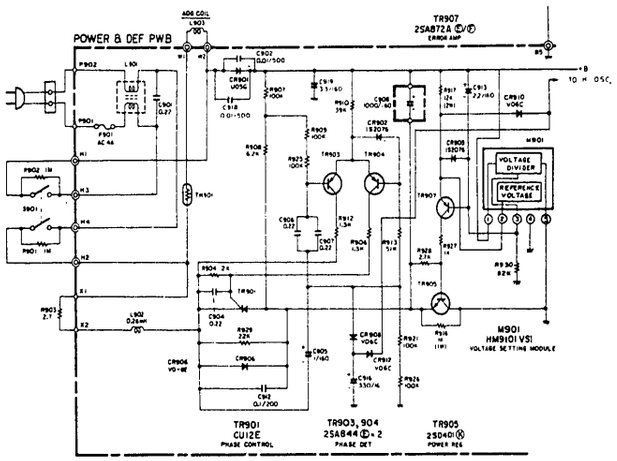


Fig. 1

2. HIGH VOLTAGE HOLD DOWN CIRCUIT

[CIRCUIT OPERATION]

For its high voltage hold down circuit, as shown Fig. 2 NP5A2X chassis uses a system in which an abnormal high voltage is detected to stop the horizontal oscillation so that the high voltage output may be zero.

When there occurs an abnormal high voltage in the receiver, negative pulses on FBT secondary winding are enlarged with the peak voltage at the terminal (1) of the high voltage detective Module (M701) increased by clamping the nagative pulse by means of CR714 and C748.

Due to this, the output voltage of the VOLTAGE DIVIDER (the terminal (2) in M701 also rises, and it develops a voltage at the terminal (3) through the DETECTOR.

As a result, a voltage is applied to the gate of the SCR (silicon controlled rectifier) TR708 to cause to conduct and its anode voltage becomes roughly zero. On the other hand, sice the anode of TR708 is connected to the base of the horizontal oscillation transistor TR702 through R748, R710 and R711, when TR708 is caused to conduct the horizontal oscillation will stop and the high voltage output will become 0V.

Since the anode of the SCR TR708 is connected to the emitter of the error amplifier transistor TR907 of the power supply circuit through R748 and CR910, when TR708 is caused to conduct the emitter potential of TR907 drops lower than the base potential and TR907 becomes "OFF" and consequently the power supply voltage (+B voltage) drops to 30 – 50V.

The SCR TR708 has a property of continuing to conduct as long as a holding current is present once it is caused to conduct.

That is to say that once TR708 is caused to conduct, it will remain conductive and continue the action of this hold down circuit until the power supply is switched off.

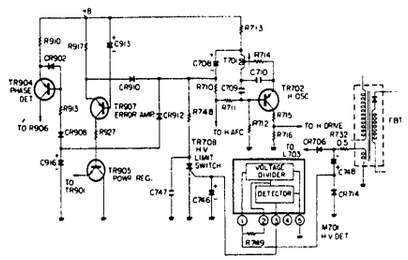


Fig. 2

Use HITACHI specified components for replacements of such components which have some effect more or less over high voltage rising.

Further, confirm without fail that hold down circuit can operate correctly.

Components (High Voltage hold down Circuit)

C716	C721	FBT	TR708	C746
C717	M901	DY	M701	C747
C718	C728	R710	CR714	C748
C719	C729	R711	CR910	R748
C720	C743	R732	CR912	R749

Caution; never disassemble M701 but exchange M701 all at once when you replace M701.

2) Check of High Voltage hold down Circuit

Condition; AC Input . . . 95 to 150V.
(It must be variable)

Step. 1; Set the AC Input voltage approximately 95V.

Step. 2; Connect Equipment-B as shown in Fig. 3, and connect jumper wire between ⊖ terminal of C908 and chassis earth.

Step. 3; Connect DC Voltmeter (presion ±2%) as shown in Fig. 3.

Step. 4; Turn the receiver on, and fully rotate BRIGHTNESS and CONTRAST VR counter clockwise.

Step. 5; Slowly increase the AC Input Voltage and confirm that picture on the screen disappeares at the indication of DC voltmeter under 141V DC.

Step. 6; Turn the receiver off, and disconnect Equipment-B, DC Voltmeter and jumper wire between C908 and chassis earth, then turn the receiver on again.

Step. 7; Connect Equipment-C as shown in Fig. 3, and confirm that the picture is steady and does not disappear at that time.

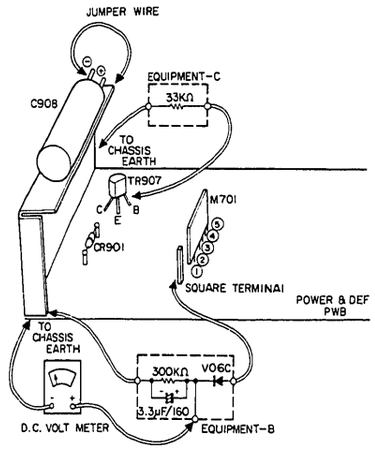


Fig. 3 CHECKING METHOD

Step. 8; Turn the receiver off, and disconnect Equipment-C.

Specification of Equipment-B

Diode	;	VO6C
Registor	;	300KΩ (±5%), ¼W
Condenser	;	3.3MF/160V
Lead Length	;	approx 200mm

Specification of Equipment-C

Registor	;	33KΩ (±5%), ¼W
Lead Length	;	approx 100mm

3. FIXED HORIZONTAL OSCILLATION COIL AND ADJUSTING PROCEDURE OF HORIZONTAL HOLD

Horizontal Oscillation Coil (H. OSC. Coil) is fixed with glue at the factory to prevent to be turned for lower frequency resulting in making abnormal high voltage in the receiver.

Therefore when you service the receiver, don't try to adjust or break the fixed H. OSC. Coil and perform the following procedure when you adjust H. HOLD.

1) Conditions where adjustment is needed.

Adjustment is needed when the following parts have been replaced.

TR702	R711	R713	C709	T701
R709	R712	R714	C710	

2) Adjusting procedure

Step. 1; Replace the fixed H. OSC. Coil (T701) with new one.

Step. 2; Turn the core of H. OSC. Coil fully counter clockwise.

Step. 3; Turn the receiver "ON".

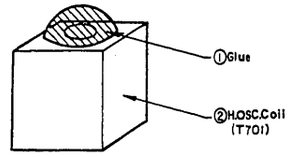
Step. 4; Eliminate the sync signal by grounding P251 with a 0.1MF/50V.

Step. 5; Obtain horizontal synchronization by turning the core of H. OSC. Coil (T701) clockwise.

Step. 6; Turn the receiver "OFF".

Step. 7; Release the capacitor connected at Step. 4.

Step. 8; Fix the H. OSC. Coil with glue as shown below.



item	parts name	parts NO.
1	Glue	2784011
2	H. OSC. Coil	2161342

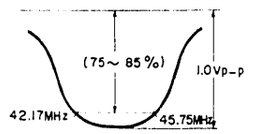
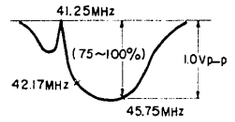
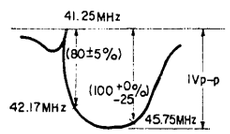
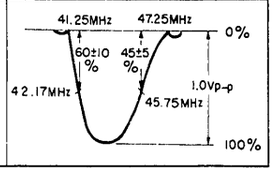
Step. 9; Confirm that the high voltage hold down circuit works correctly.
(refer to the checking method of the high voltage hold down circuit)

INSTALLATION AND ALIGNMENT

1. VIF CIRCUIT ALIGNMENT

Voltage supply and connections · · · · See Fig. 4.

1) Apply + 3.5V to the terminal TP14.
2) Apply + 12.0V to the terminal P1.
3) Connect Oscilloscope to the terminal TP12.
4) Marker generator. (35–50 MHz).
5) Sweep generator (35 – 50 MHz).

STEP	SIGNAL GENERATOR	OSCILLOSCOPE	ALIGNMENT CIRCUIT	ALIGN-MENT	ALIGNMENT PROCEDURE	WAVEFORM
1	Collecter of TR202 {Marker gener. Sweep gener.}	TP12	V-IF	T203 T204 (L206)	Get rid of L206 out of its band range by alignment. Adjust the T203, T204. So out put of waveform become as in Fig.	
2	Collecter of TR202. {Marker gener. Sweep gener.}	TP12	V-IF (Final Trap)	L206	Adjust the marker to 41.25 MHz and adjust L206 to minimize oscillation of the out-put as in Fig.	
3	Collecter of TR202. {Marker gener. Sweep gener.}	TP12	V-IF	T203 T204	Adjust the T203, T204 so output of waveform become as in Fig.	
4	Tuner TP. {Marker gener. Sweep gener.}	TP12	V-IF	CP201 CP203 CP202	47.25 MHz – min. 39.75 MHz – min. 41.25 MHz – min.	
5	Tuner TP. {Marker gener. Sweep gener.}	TP12	V-IF	L201 L202	Adjust the levels of 45.75 MHz, 42.17 MHz to be as shown in Fig.	

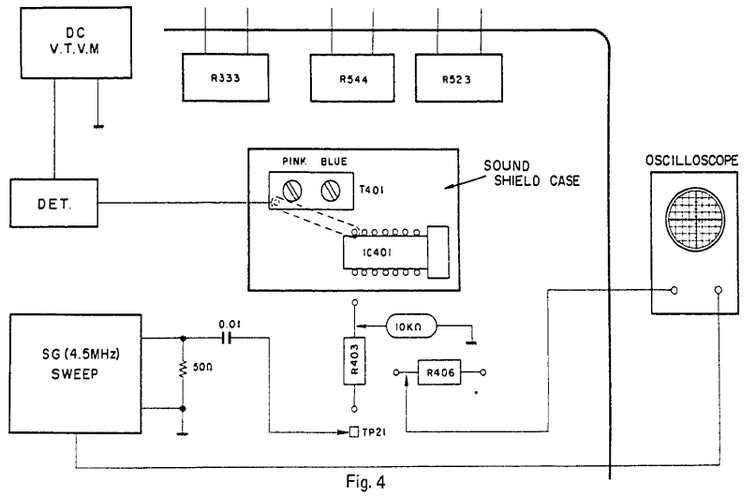
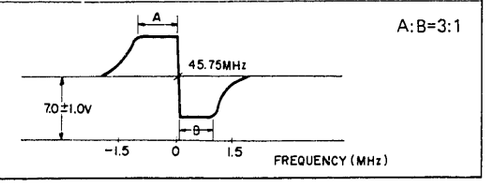


Fig. 4

2. AFC CIRCUIT ALIGNMENT

Voltage supply and connections .

1) Apply + 12.0V to the terminal P1.
2) Apply + 3.5V to the terminal TP14.
3) Marker generator (35 ~ 50 MHz).
4) Sweep generator (35 ~ 50 MHz).
3), 4) Connect to the (H) terminal of Oscilloscope.
5) Connet Oscilloscope to the terminal A3.

SIGNAL	OSCILLOSCOPE	ALIGNMENT	ALIGNMENT PROCEDURE
Tuner TP {Marker generator 45.75 MHz}	A3	L002	Adjust the L002 so output voltage of F2 becomes 7.0 ± 1.0V on Oscilloscope DC voltage range.
Tuner TP {Marker generator Sweep generator}	A3	T001	Adjust the T001 so output of signal as Fig. 

3. SIF CIRCUIT ALIGNMENT

Voltage supply.

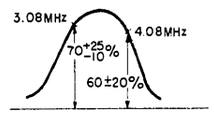
1) Apply + 12.0V to the terminal P1 · · · · See Fig. 4.

SIGNAL	AC V.T.V.M.	ALIGNMENT CIRCUIT	ALIGNMENT	ALIGNMENT PROCEDURE
TP21. Signal generator 4.5 MHz/400 Hz FM ··· ± 25 KHz devi. 300-100mVrms output	R406	S-IF	T401 (PINK) T401 (BLUE)	Adjust the T401 (PINK & BLUE) so output of signal becomes maximum.

4. BAND-PASS CIRCUIT ALIGNMENT

Voltage supply and connections.

1) Apply + 3.5V to the terminal TP14.
2) Apply + 12.0V to the terminal P1.

STEP	SIGNAL GENERATOR	OSCILLOSCOPE	ALIGNMENT CIRCUIT	ALIGN-MENT	ALIGNMENT PROCEDURE	WAVEFORME
1	Connection point of L209, C229 (4.5MHz S.G)	TP12 (V.T.V.M)	4.5 MHz trap.	L211	Adjust the L211 so output of signal becomes minimum.	———
2	Tuner TP. (Marker gener. / Sweep gener.)	TP41	Band-pass	L501	Adjust the marker to 4.08 MHz and adjust L501 so output of signal at 4.08 MHz becomes maximum.	———
3	Tuner TP. (Marker gener. / Sweep gener.)	TP41	Band-pass	T501	Adjust the marker to 3.58 MHz and adjust T501 so output of signal at 3.58 MHz becomes flat.	———
4	Tuner TP. (Marker gener. / Sweep gener.)	TP41	Band-pass	L501 T501	Adjust the L501, T501 so output of waveform become as in Fig	

5. CHROMA SYNC. CIRCUIT ADJUSTMENT

SIGNAL	ALIGNMENT CIRCUIT	ALIGNMENT	ALIGNMENT PROCEDURE
Antenna terminal (Color bar generator)	Chroma	Color VR (R544) Tint VR (R523) Cont. VR (R334)	Adjust the color, tint, cont. to click position.
	Connect the TP43 and P1 by jamper wire, also connect the 22kΩ between TP45 and ground.		
	Chroma	R525	Adjust the R525 until color sync may be stoped.
	Release the jamper wire and 22kΩ.		

6. HORIZONTAL CIRCUIT ADJUSTMENT

ALIGNMENT CIRCUIT	ALIGNMENT	ALIGNMENT PROCEDURE
H. Hold	T701	Refer to the Technical Caution Page 6.7.
H. SIZE	ADJ. pin of H. size	Adjust to obtain the ideal picture on the screen.
H. CENTER	ADJ. pin of H. center	

7. VERTICAL CIRCUIT ADJUSTMENT

ALIGNMENT CIRCUIT	ALIGNMENT	ALIGNMENT PROCEDURE
SUB V. HOLD	R605	Turn R605 fully clockwise, and then turn R607 fully counter clockwise. Connect the 8.2kΩ between the terminal P601 and P602. Turn slowly R605 counter-clockwise watching picture on the screen and stop it at the point that the picture is starting to roll up. Then release the resistor 8.2kΩ and turn R607 clockwise to obtain sync.
V. SIZE	R612	Adjust to obtain the ideal picture on the screen.
V. LINEALTY	R610	

8. FOCUS ADJUSTMENT

Receive broadcasting and adjust the focus VR (R751) so that the best focus can be obtained for all over the surface of the image in a bright condition.

9. PREPARATION OF PURITY AND CONVERCENCE ALIGNMENT

1) Install the deflection yoke to the CPT and press full up to the funnel of the CPT.
2) Install the C-F magnet (convergence free magnet assembly) in a position 35mm (1-3/8") from the end of the CPT neck as shown in Fig. 5 and align horizontally the six tabs of purity magnet, 4-pole magnet and 6-pole magnet. The tab of the purity magnet should be on a different level.
3) Attach the CPT PWB to the CPT. When doing this, make sure that the CPT ground connector (P31) is connected.
4) Switch on the power supply to the TV set to warm it up. Wait more than 10 minutes before proceeding to make purity adjustment.
5) Face the TV set to the north and demagnetize CPT, chassis and peripheral parts by means of the demagnetizing coil.
6) Check the horizontal size, vertical linearity and vertical size and then turn the contrast control fully to the right and adjust the focus VR(R751) so that the best focus is obtained in the center of the picture.
7) Set the contrast VR to the click point and roughly adjust the static convergence. (Refer to Static Convergence Adjustment)
8) Now make sure that more than 10 minutes have passed after the TV set was switched on for warming up.

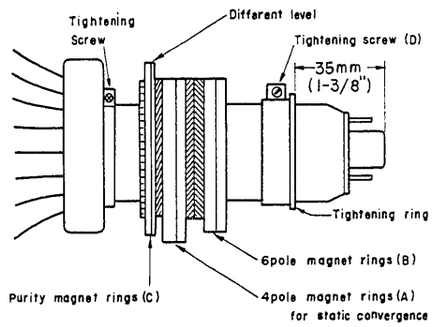


Fig. 5

10. PURITY ADJUSTMENT

1) Push the deflection yoke full up to the CPT funnel surface.
2) Disconnect G-plug from P3 on the signal PWB and bring the magenta belt in the center of the screen (Fig. 6-A). Reduce the color impurity areas on the right and left sides, sliding the deflection yoke backward. (Fig. 6-B).
3) After minimizing the magnetic intensity of the purity magnet (bring the long and the short tabs together), turn the purity magnet ring so that the color impurity areas on both sides become equal. (Fig. 6-C)
4) Insert the wedge between the deflection yoke and CPT funnel from right above to prevent the deflection yoke from tilting excessively.
5) Make sure that the vertical center line is within ±5mm (±1/5") from the geometric center line. If this condition is not satisfied, turn the purity magnet rings to make adjustment without disturbing the equality in size of the color impurity areas on both sides. In doing this, the amount of movement in a vertical direction should be limited to within ±2mm (±1/12"). If the movement is too large, the focus will loose sharpness near the outer edges of the picture.
6) Slide the deflection yoke slowly backward until the color impurity on the right and left sides disappear roughly at the same time and lock the yoke in that position by lightly tightening a screw (Fig. 5). Pull out B-plug (P4) and check the red purity. If impurity still remains, slightly move the deflection yoke backward and forward until the impurity disappears. Make a similar check of the blue purity (B-plug, P4) and the green purity (G-plug, P3).
7) The above adjustments were made with the TV set facing northward. Turn the set so that it faces southward and demagnetize by means of the demagnetizing coil and then check the red, green and blue purity, respectively. If some impurity is seen still remaining, move the deflection yoke backward and forward to make adjustments and make a similar check again with the set turned to face northward.
8) The purity adjustment is now completed. Fasten the deflection yoke by tightening the screw (Fig. 5) while paying attention to the tilting of the picture.

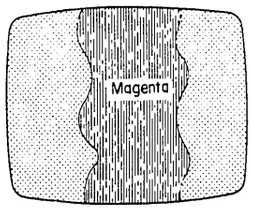


Fig. 6-A

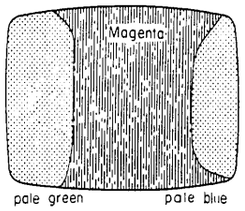


Fig. 6-B

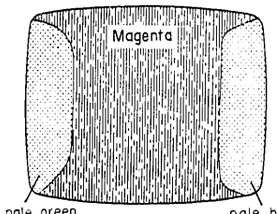


Fig. 6-C

11. STATIC CONVERGENCE ALIGNMENT (The center part of the screen)

1) Static convergence adjustment is done by turning the 4-pole and 6-pole magnet rings of C-F magnet assembly. The 4-pole magnet rings are used for red and blue alignment and the 6-pole magnet rings for the adjustment of red/blue and green.
2) Perform the following adjustment while paying attention to the center area of the screen.

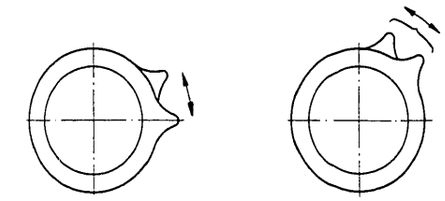


Fig. 7

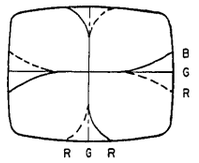
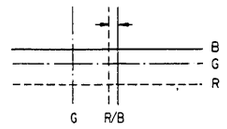
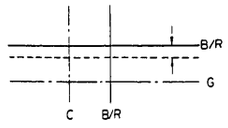
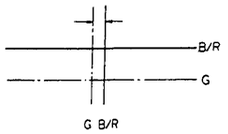
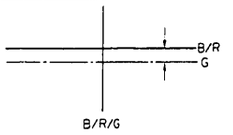


Fig. 8

STEP	CONVERGING LINES	MAGNET RINGS (Fig. 7)	ADJUSTMENT (Fig. 7)	CENTER OF THE SCREEN
1	Vertical Blue and Red	4 pole magnet rings	adjust by "sliding"	
2	Horizontal Blue and Red	4 pole magnet rings	adjust by "rotating"	
3	Vertical B/R and Green	6 pole magnet rings	adjust by "sliding"	
4	Horizontal B/R and Green	6 pole magnet rings	adjust by "rotating"	
5	See that all the lines are converged, at the center part if not repeat step 1 and 2.			

12. DYNAMIC CONVERGENCE ALIGNMENT (The outer edges of the picture)

1) When the static convergence alignment is completed, the misconvergence on the screen appear as shown in Fig. 9-A.
2) In this chassis, dynamic convergence (convergence at the outer edges of the picture) is done by tilting deflection yoke up or down and right or left. Then fix the deflection yoke with three wedges.
   At first slowly insert a wedge between the deflection yoke and the CPT funnel rightly from the direction of 12 o'clock and merge the red and blue vertical lines at top and bottom of the screen and merge the red and blue horizontal lines on the right and left sides of the screen.
3) Prepare three wedges and fill their grooves with silicon gum.
4) When blue is outside of red on the right side of the screen and a< b, insert a wedge with its groove filled with silicon gum between the deflection yoke and the CPT funnel from the direction of 3 o'clock so that a ≒ b. (Fig. 9)
5) When red is outside of blue on the left side of the screen and a > b, insert a wedge with its groove filled with silicon gum from the direction of 9 o'clock so that a ≒ b. (Fig. 10)
6) Insert wedges at the angles of 120° from the wedge which was inserted in Step 4) or Step 5), that is, from the directions of 7 o'clock and 11 o'clock in the case of Step 4) and 1 o'clock and 5 o'clock in the case of Step 5) and fix the wedges by means of adhesive tape. The wedges and tape should be more than 20mm (3/4") away from the anode cap.
7) Pull out the wedge that was inserted from the direction of 12 o'clock in Step 2) and make sure that the deflection yoke is fixed securely.

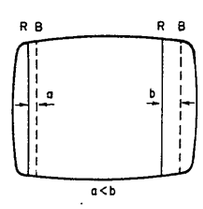


Fig. 9-A

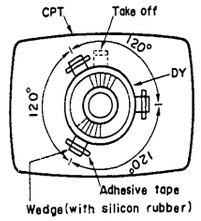


Fig. 9-B

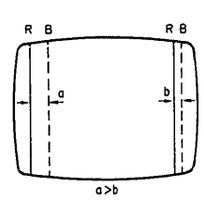


Fig. 10-A

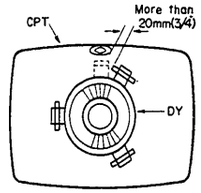


Fig. 10-B

13. WHITE BALANCE ALIGNMENT

1) Receive broadcasting (In the case of color broadcasting, put out colors.), turn COLOR-LOK Switch to "OFF" (CR-320 only), turn contrast control R334 fully counter-clockwise and turn Brightness control R333 fully clockwise.
2) Turn Screen control R871 and BKG (Background) control, R853(red), R859(green) and R865(blue) of CPT P.W. board fully counterclockwise.
3) Disconnect 1 pin connector from P5 of the signal P.W. board.
4) Stop vertical oscillation by jamp-wire between the terminal side of R602 and CHASSIS EARTH.
5) Gently turn Screen control clockwise and set it to a point where a horizontal line of any one of red, green and blue can be dimly seen. Then, adjust BKG control so that all of red, blue and green can be dimly seen.
6) After generating vertical oscillation by release the jamp-wire connected at Step. 4), connect the 1 pin connector to P5 of the signal P.W. board.
7) Achieve white balance for the high brightness part by means of the Drive control R856(green) and R862(blue) of CPT P.W. board.
8) Ensure that white balance for the low brightness part is held by reducing the brightness. In case the white balance is deviated, regulate it by turning BKG control slightly. Depending on the content of receiving program, there are cases in which brightness cannot be reduced enough. In that case, carry out the alignment watching the dark part in the image.

14. COLOR and BRIGHTNESS ALIGNMENT

This alignment should be carried out after finishing alignment of the white balance. The brightness around the set should be made about the same as that at night with a television set turned ON.

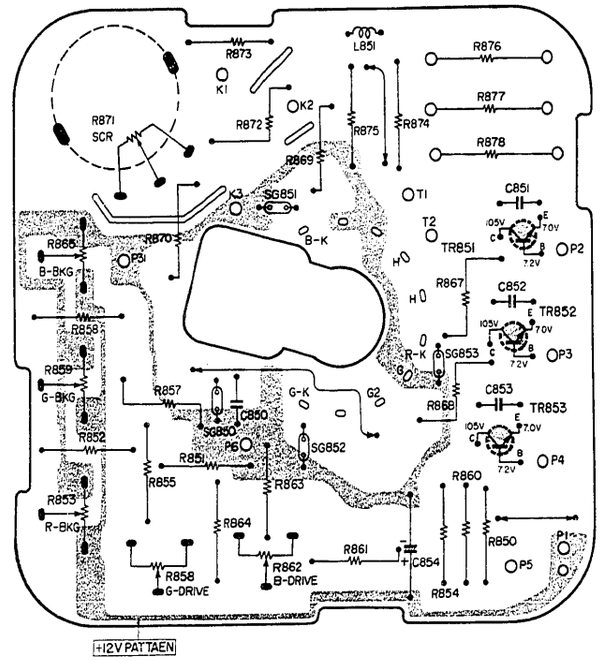
1) Receive color broadcasting, and turn COLOR-LOK Switch to "OFF" (CR-320 only).
2) Turn Cont. control R334 and Color control R544 counterclockwise. Set Brightness control R333 and Tint control R523 to the click positions respectively.
3) Turn and set the sub-brightness control R332 to that the black part of the screen (including human hairs) can be properly seen.
4) With COLOR-LOK Switch set to ON (CR-320 only), set Cont. control R334 and Color control R544 to the click positions respectively. In this state, set Sub Color Saturation control R545 so that a proper color depth can be obtained.
5) Furthermore, even with COLOR-LOK Switch set to ON, Color control R544 and Tint control R523 can be finely regulated. (CR-320 only) So, when the color tone is not proper, regulate it by turning Tint control R523.

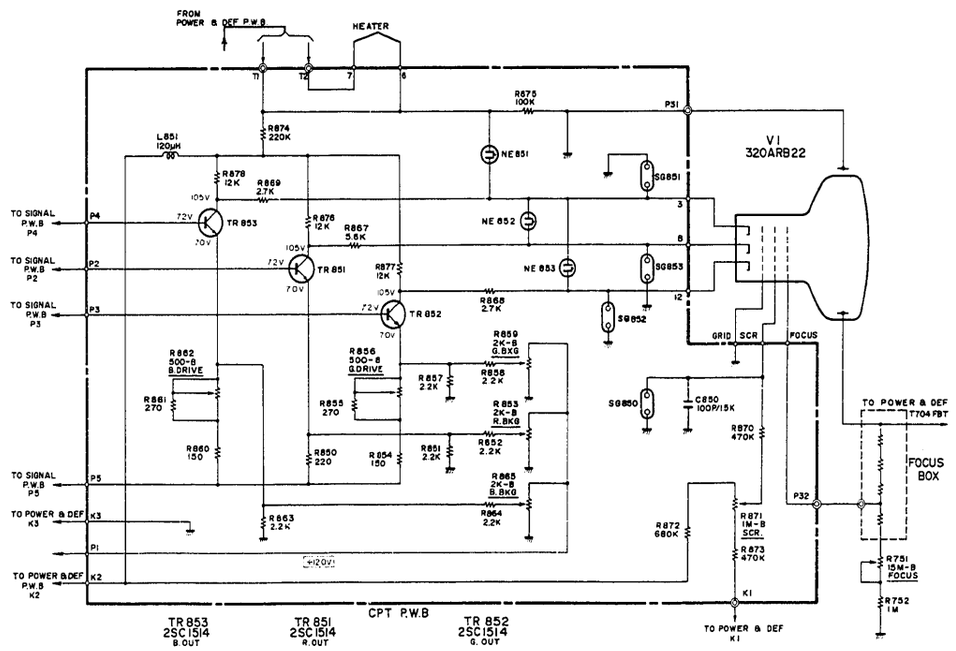
15. AGC ADJUSTMENT

Set the channel selector dial to a channel (7 – 13ch) and apply a signal (1.3mV) to the VHF terminal on the antenna terminal board. Next, set the fine tuning control correctly. Then connect a voltmeter across CR256, with (+) on the cathode side and adjust R265 so that the voltage across CR256 becomes 0V.
The AGC adjustment must be performed two minutes after the power supply was turned on.
If the signal voltage is not certain, you may adjust R265 with watching picture on the screen as to be obtained the least noisy picture. Then confirm the picture does not wind when power switch is turned on. If the picture winds, turn R265 clockwise a little.

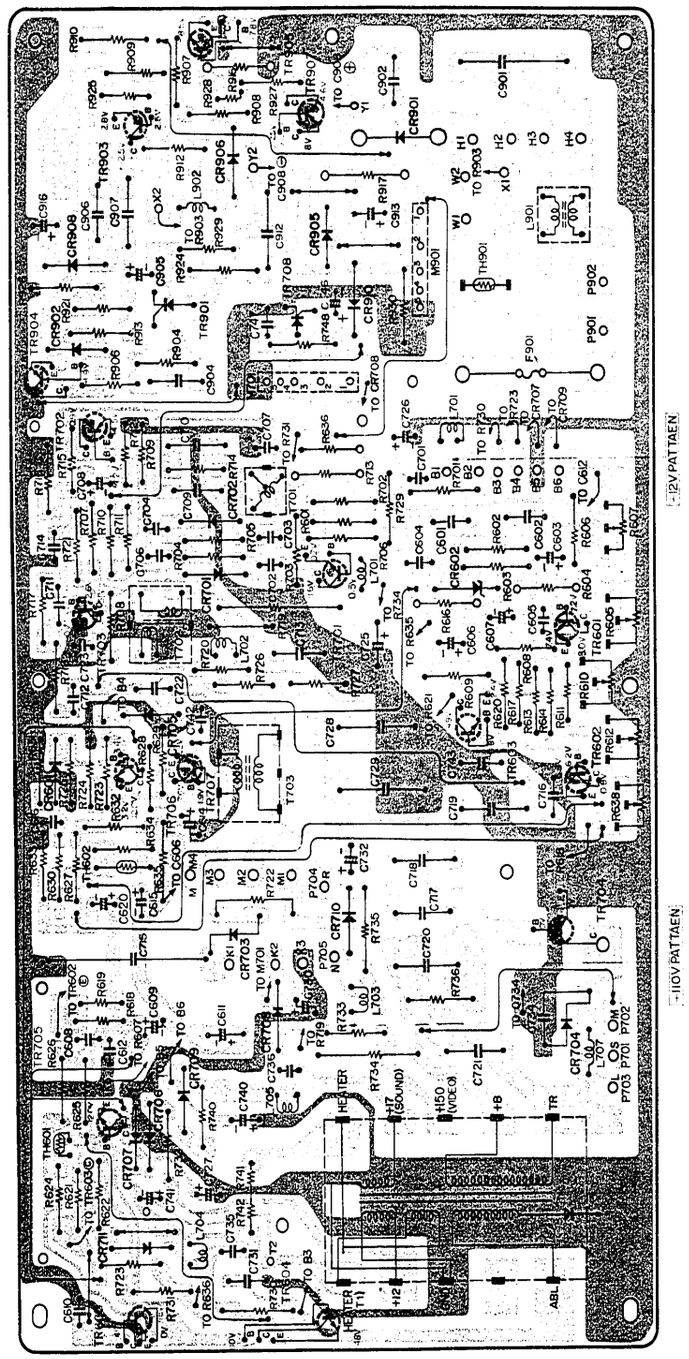
PRINTED WIRING BOARD, CIRCUIT

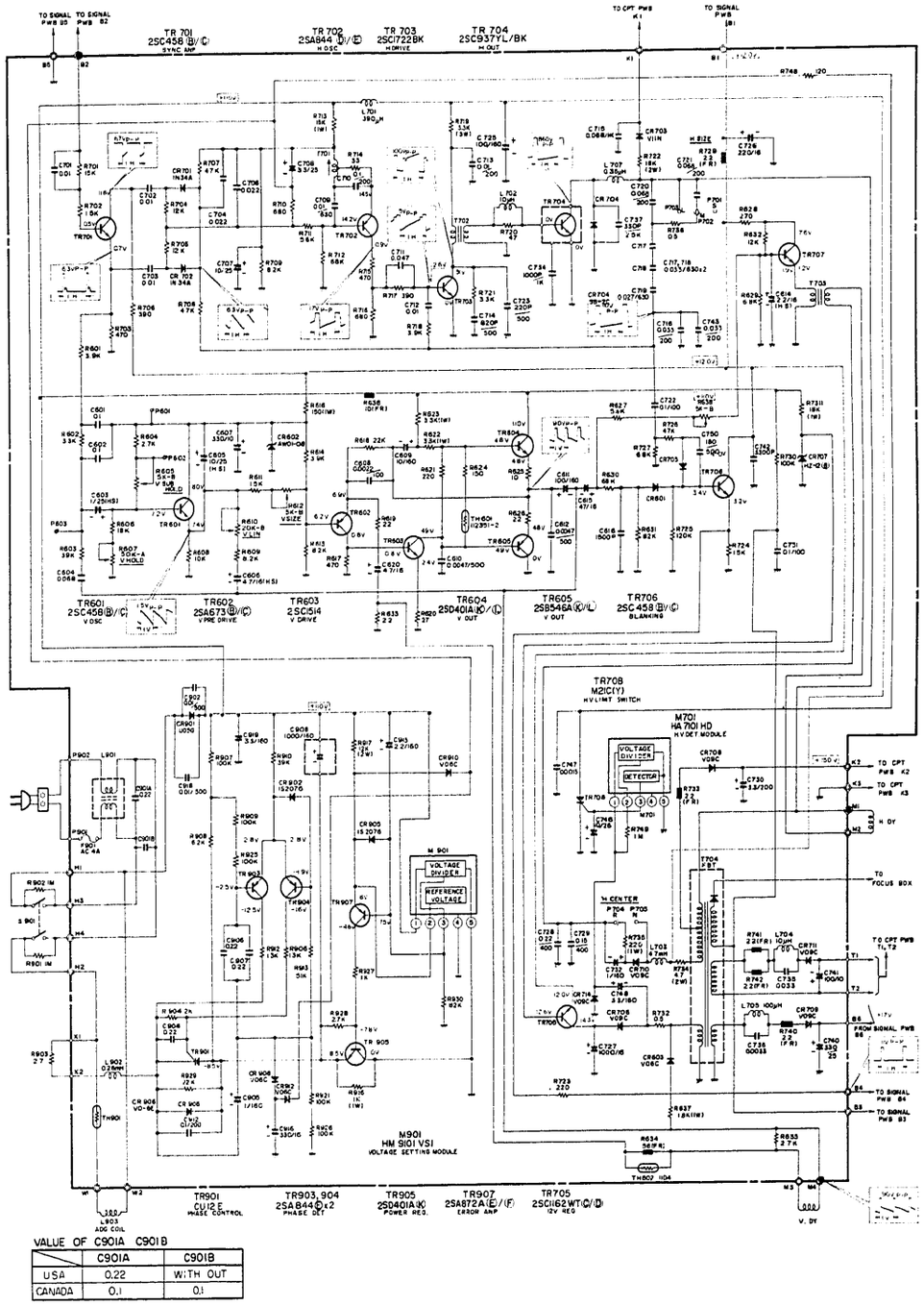
1. CPT BOARD





2. POWER/DEF. BOARD

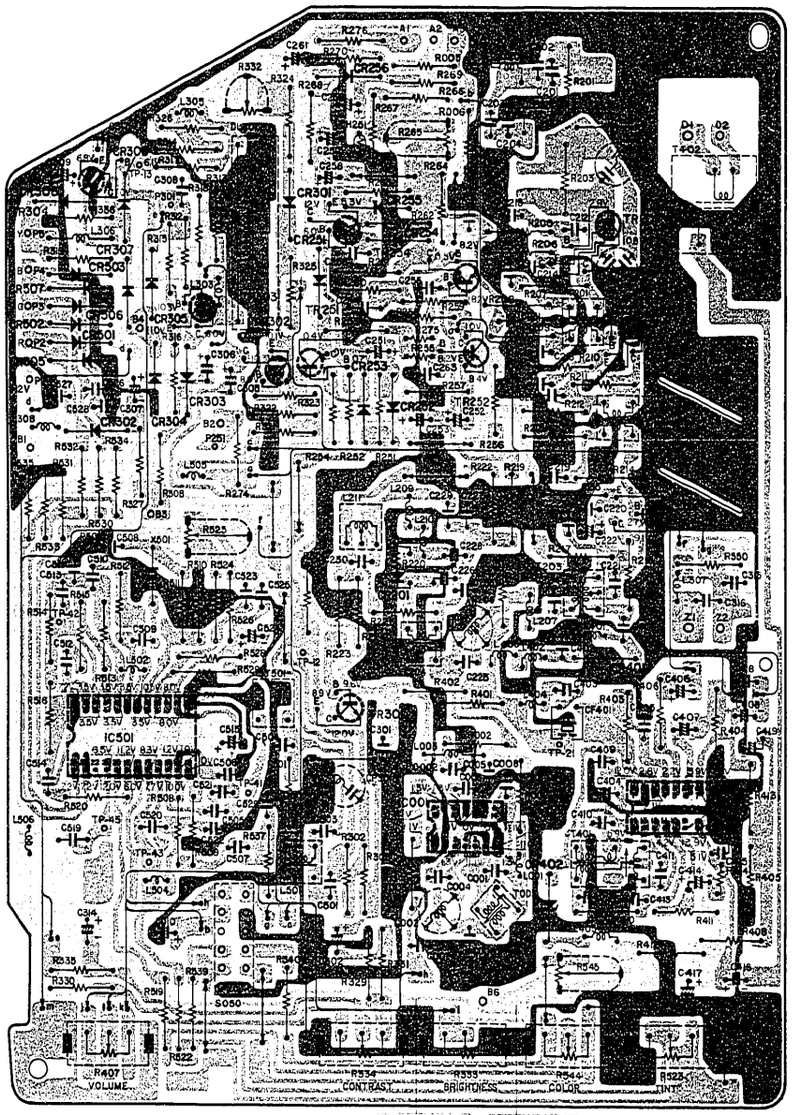


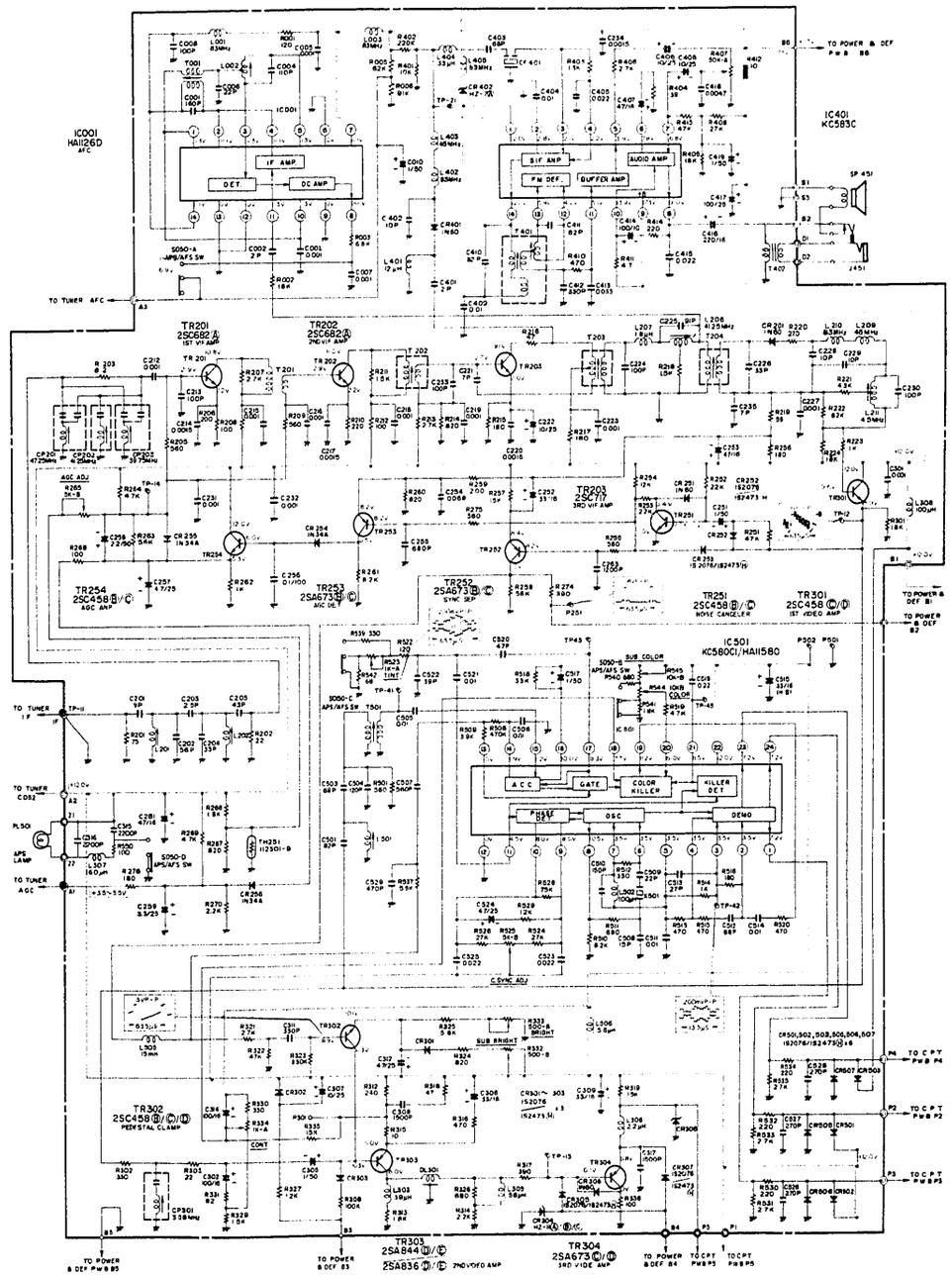

TR701 2SC458(B)/(C) SYNC AMP
TR702 2SA844(D)/(E) H OSC
TR703 2SCI722BK H DRIVE
TR704 2SC937YL/BK H OUT
TR601 2SC458(B)/(C) V OSC
TR602 2SA673(B)/(C) V PRE DRIVE
TR603 2SCI514 V DRIVE
TR604 2SD40IA(K)/(L) V OUT
TR605 2SB546A(K)/(L) V OUT
TR706 2SC458(B)/(C) BLANKING
TR708 M2IC(Y) H-V LIMIT SWITCH
M701 HA7601 HD H-V DET MODULE
M901 HM 9101 VSI VOLTAGE SETTING MODULE
TR901 CU12E PHASE CONTROL
TR903,904 2SA844(D)x2 PHASE DET
TR905 2SD401A(K) POWER REG.
TR907 2SA872A(E)/(F) ERROR AMP
TR705 2SCII62WT(C/D) 12V REG
TO SIGNAL PWB B5
TO SIGNAL PWB B2
TO CPT PWB K1
TO SIGNAL PWB B1
TO CPT PWB K2
TO CPT PWB K3
TO FOCUS BOX
TO CPT PWB T1, T2
FROM SIGNAL PWB B6
TO SIGNAL PWB B4
TO SIGNAL PWB B3
H. DY
V. DY

VALUE OF C901A C901B

	C901A	C901B
USA	0.22	WITH OUT
CANADA	0.1	0.1

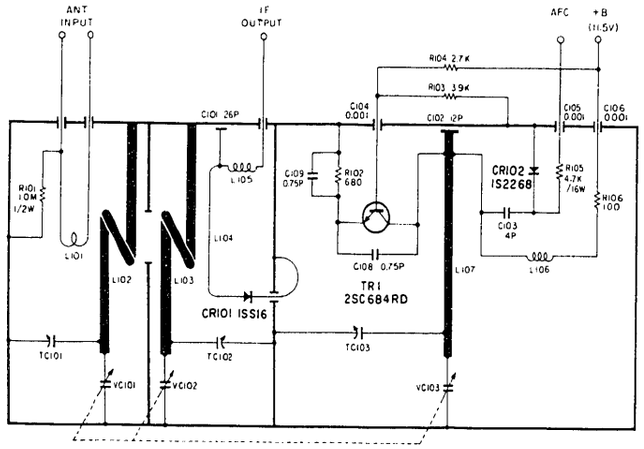
3. SIGNAL BOARD



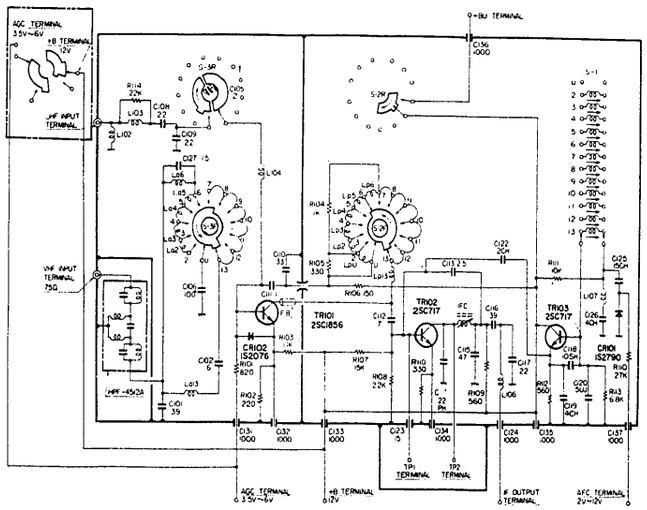


TUNER CIRCUIT SCHEMATIC DIAGRAM

UHF TUNER (HU-354C)

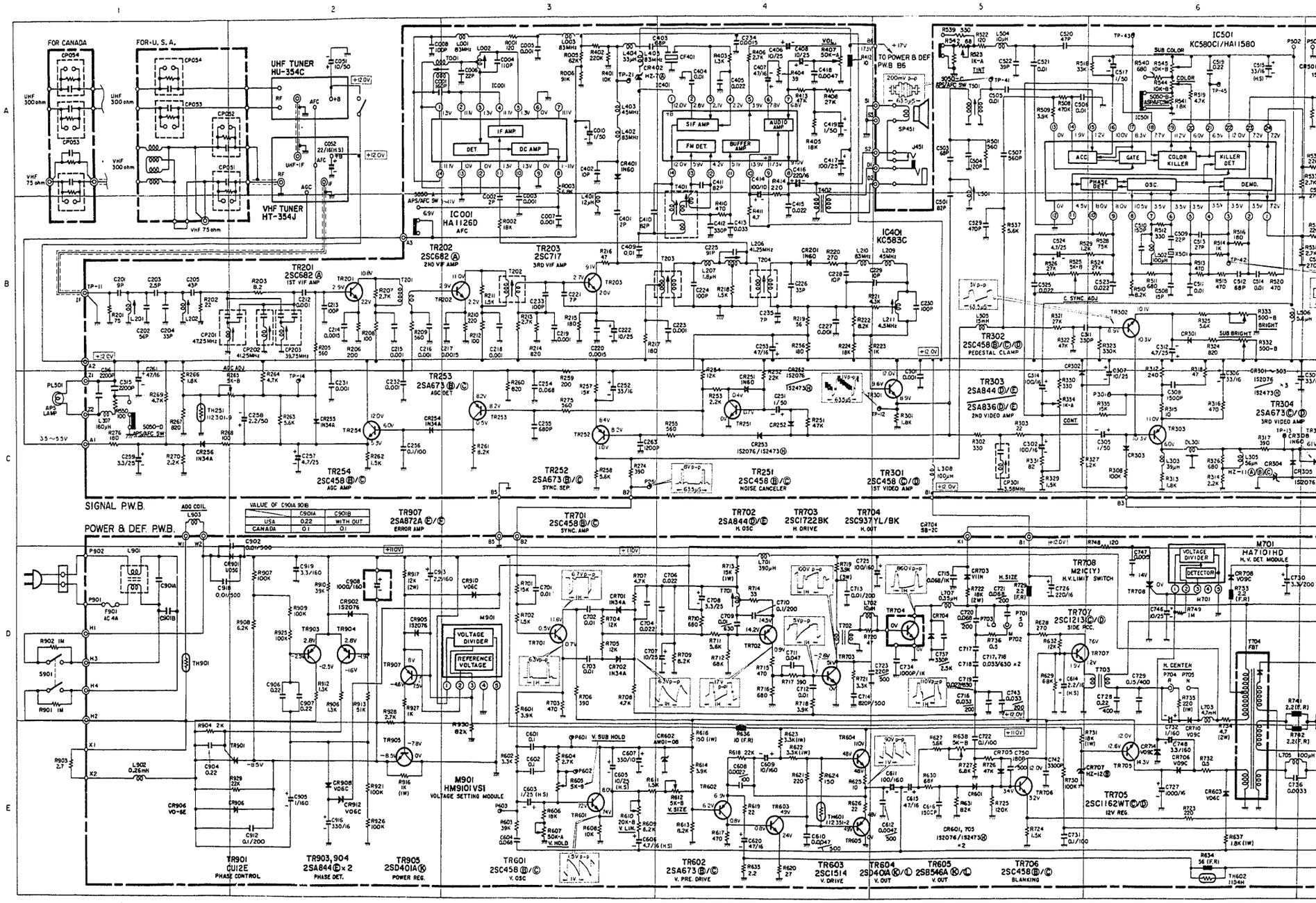


VHF TUNER (HT-354J)



BASIC CIRCUIT SCHEMATIC DIAGRAM (CR-316, CR-320)

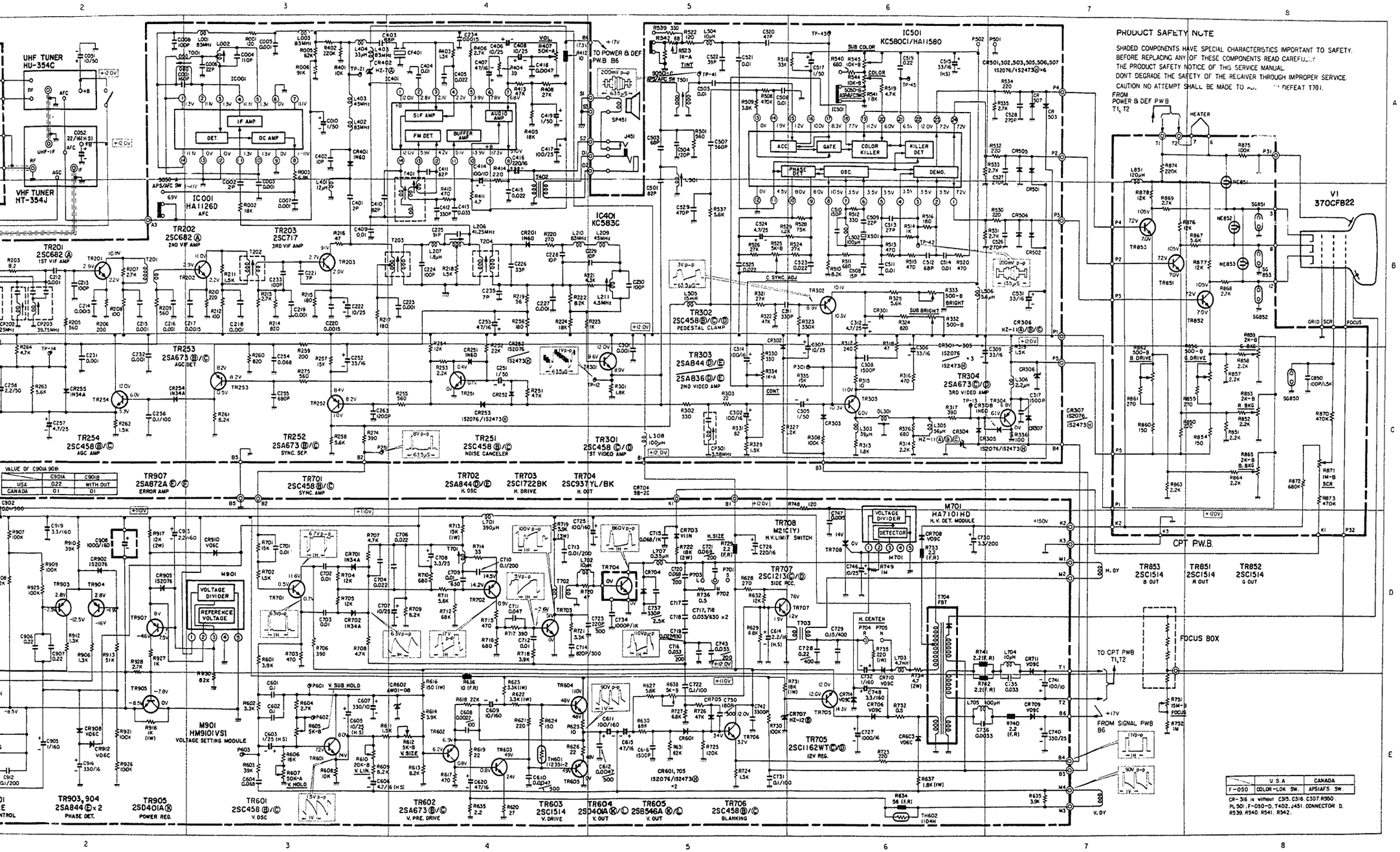
SHADED COMPO
REPLACING AN
OF THIS SERVI
PROPER SERVIC


FOR CANADA
FOR U.S.A.
UHF TUNER HU-354C
VHF TUNER HT-354J
IC001 HA1126D AFC
IC501 KC580CI/HAI1580
IC401 KC583C
TR201 2SC682 (A) 1ST VIF AMP
TR202 2SC682 (A) 2ND VIF AMP
TR203 2SC717 3RD VIF AMP
TR253 2SA673 (B)/(C) AGC DET
TR254 2SC458 (B)/(C) AGC AMP
TR252 2SA673 (B)/(C) SYNC. SEP.
TR251 2SC458 (B)/(C) NOISE CANCELER
TR301 2SC458 (C)/(D) 1ST VIDEO AMP
TR302 2SC458 (B)/(C)/(D) PEDESTAL CLAMP
TR303 2SA844 (D)/(E) 2SA836 (D)/(E) 2ND VIDEO AMP
TR304 2SA673 (C)/(D) 3RD VIDEO AMP
SIGNAL P.W.B.
POWER & DEF. P.W.B.
TR907 2SA872A (E)/(F) ERROR AMP
TR701 2SC458 (B)/(C) SYNC. AMP
TR702 2SA844 (D)/(E) H. OSC
TR703 2SC1722BK H. DRIVE
TR704 2SC937YL/BK H. OUT
M701 HA7101HD H.V. DET. MODULE
TR708 M21C(Y) H.V.LIMIT SWITCH
TR707 2SC1213 (C)/(D) SIDE PCC.
TR705 2SC1162WT (C)/(D) 12V REG.
M901 HM9101VSI VOLTAGE SETTING MODULE
TR901 CUI2E PHASE CONTROL
TR903, 904 2SA844 (E) × 2 PHASE DET.
TR905 2SD401A (K) POWER REG.
TR601 2SC458 (B)/(C) V. OSC
TR602 2SA673 (B)/(C) V. PRE. DRIVE
TR603 2SC1514 V. DRIVE
TR604 2SD401A (K)/(L) V. OUT
TR605 2SB546A (K)/(L) V. OUT
TR706 2SC458 (B)/(C) BLANKING
VALUE OF C901A 901B
USA 0.22 WITH OUT
CANADA 0.1 01

BASIC CIRCUIT SCHEMATIC DIAGRAM (CR-316, CR-320)

PRODUCT SAFETY NOTE

SHADED COMPONENTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE OF THIS SERVICE MANUAL. DON'T DEGRADE THE SAFETY OF THE RECEIVER THROUGH IMPROPER SERVICING.



REPLACEMENT PARTS LIST

NOTE: "PLACE" means the place of each part in the circuit diagram.
※ marked parts are only use for CR-320.

PRODUCT SAFETY NOTE – Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
CAPACITORS					
A2	C001	0249092	Ceramic	160pF ±5%	DC50WV
B3	C002	0248632	Ceramic	2pF ±0.25pF	DC50WV
B3	C003	0244101	Ceramic	1000pF ±10%	DC50WV
A3	C004	0249091	Ceramic	110pF ±5%	DC50WV
A3	C005	0244101	Ceramic	1000pF ±10%	DC50WV
A3	C006	0248668	Ceramic	22pF ±5%	DC50WV
B3	C007	0244101	Ceramic	1000pF ±10%	DC50WV
A2	C008	0248684	Ceramic	100pF ±5%	DC50WV
A3	C010	0252811	Electrolytic	1μF	DC50WV
A2	C051	0252621	Electrolytic	10μF	DC50WV
A2	C052	0251079	Electrolytic	22μF ±20%	DC16WV
B1	C201	0248639	Ceramic	9pF ±0.25pF	DC50WV
B1	C202	0249026	Ceramic	56pF ±5%	DC50WV
B1	C203	0248761	Ceramic	2.5pF ±0.25pF	DC50WV
B1	C204	0249025	Ceramic	33pF ±5%	DC50WV
B1	C205	0248675	Ceramic	43pF ±5%	DC50WV
B2	C212	0244101	Ceramic	1000pF ±10%	DC50WV
B2	C213	0248684	Ceramic	100pF ±5%	DC50WV
B2	C214	0244103	Ceramic	1500pF ±10%	DC50WV
B2	C215	0244101	Ceramic	1000pF ±10%	DC50WV
B2	C216	0244101	Ceramic	1000pF ±10%	DC50WV
B3	C217	0244103	Ceramic	1500pF ±10%	DC50WV
B3	C218	0244101	Ceramic	1000pF ±10%	DC50WV
B3	C219	0244101	Ceramic	1000pF ±10%	DC50WV
B3	C220	0244103	Ceramic	1500pF ±10%	DC50WV
B3	C221	0248637	Ceramic	7pF ±0.25pF	DC50WV
B3	C222	0252621	Electrolytic	10μF	DC25WV
B4	C223	0244101	Ceramic	1000pF ±10%	DC50WV
B4	C224	0246594	Ceramic	100pF ±5%	DC50WV
B4	C225	0249042	Ceramic	91pF ±5%	DC50WV
B4	C226	0246582	Ceramic	33pF ±5%	DC50WV
B4	C227	0244101	Ceramic	1000pF ±10%	DC50WV
B4	C228	0248650	Ceramic	10pF ±0.5pF	DC50WV
B5	C229	0248650	Ceramic	10pF ±0.5pF	DC50WV
B5	C230	0248054	Ceramic	100pF ±5%	DC50WV
C2	C231	0244101	Ceramic	1000pF ±10%	DC50WV
C2	C232	0244101	Ceramic	1000pF ±10%	DC50WV
B3	C233	0249043	Ceramic	100pF ±5%	DC50WV
B4	C235	0248637	Ceramic	7pF ±0.25pF	DC50WV
C4	C251	0252811	Electrolytic	1μF	DC50WV
C3	C252	0252523	Electrolytic	33μF	DC16WV
B4	C253	0252525	Electrolytic	47μF	DC16WV
C3	C254	0275822	Polyester film	0.068μF ±10%	DC100WV
C3	C255	0244117	Ceramic	680pF ±10%	DC50WV
C2	C256	0274490	Polyester film	0.1μF ±10%	DC100WV
C2	C257	0252615	Electrolytic	4.7μF	DC25WV
C2	C258	0252817	Electrolytic	2.2μF	DC50WV
C1	C259	0252613	Electrolytic	3.3μF	DC25WV
C1	C261	0252525	Electrolytic	47μF	DC16WV
C3	C263	0244102	Ceramic	1200pF±10%	DC50WV
C4	C301	0244101	Ceramic	1000pF±10%	DC50WV
C5	C302	C252531	Electrolytic	100μF	DC16WV
C6	C305	0252811	Electrolytic	1μF	DC50WV
C6	C306	0252523	Electrolytic	33μF	DC16WV
C6	C307	0252621	Electrolytic	10μF	DC25WV
C6	C308	0275023	Polyester film	1500pF±10%	DC50WV
C6	C309	0252523	Electrolytic	33μF	DC16WV
B5	C311	0248696	Ceramic	330pF ±5%	DC50WV
B6	C312	0252615	Electrolytic	4.7μF	DC25WV
C5	C314	0252531	Electrolytic	100μF	DC16WV
※C1	C315	0244105	Ceramic	2200pF ±10%	DC50WV
※C1	C316	0244105	Ceramic	2200pF ±10%	DC50WV
C7	C317	0274012	Polyester film	1500pF ±10%	DC50WV
B3	C401	0248632	Ceramic	2pF ±0.25pF	DC50WV
A3	C402	0248650	Ceramic	10pF ±0.5pF	DC50WV
A3	C403	0248680	Ceramic	68pF ±5%	DC50WV
A4	C404	0244171	Ceramic	0.01μF +100% −0%	DC50WV
A4	C405	0275013	Polyester film	0.022μF ±10%	DC50WV
A4	C406	0252621	Electrolytic	10μF	DC25WV
A4	C407	0252525	Electrolytic	47μF	DC16WV
A4	C408	0252621	Electrolytic	10μF	DC25WV
B3	C409	0244171	Ceramic	0.01μF +100% −0%	DC50WV
B3	C410	0248052	Ceramic	82pF ±5%	DC50WV
A4	C411	0248052	Ceramic	82pF ±5%	DC50WV
B4	C412	0244113	Ceramic	330pF ±10%	DC50WV
B4	C413	0275014	Polyester film	0.033μF ±10%	DC50WV
B4	C414	0252331	Electrolytic	100μF	DC10WV
B4	C415	0275013	Polyester film	0.022μF ±10%	DC50WV
A4	C416	0252532	Electrolytic	220μF	DC16WV
A4	C417	0252631	Electrolytic	100μF	DC25WV
A4	C418	0244165	Ceramic	4700pF +100% −0%	DC50WV
A4	C419	0252811	Electrolytic	1μF	DC50WV
B5	C501	0248682	Ceramic	82pF ±5%	DC50WV
A5	C503	0248680	Ceramic	68pF ±5%	DC50WV
A5	C504	0248686	Ceramic	120pF ±5%	DC50WV
A5	C505	0244171	Ceramic	0.01μF +100% −0%	DC50WV
A5	C506	0244171	Ceramic	0.01μF +100% −0%	DC50WV
A5	C507	0248698	Ceramic	560pF ±5%	DC50WV
B6	C508	0246444	Ceramic	15pF ±5%	DC50WV
B6	C509	0246448	Ceramic	22pF ±5%	DC50WV
B6	C510	0246598	Ceramic	150pF ±5%	DC50WV
B6	C511	0244171	Ceramic	0.01μF +100% −0%	DC50WV
B6	C512	0248680	Ceramic	68pF ±5%	DC50WV
B6	C513	0248670	Ceramic	27pF ±5%	DC50WV
B6	C514	0244171	Ceramic	0.01μF +100% −0%	DC50WV
A6	C515	0259808	Electrolytic	33μF ±20%	DC16WV
A6	C517	0252811	Electrolytic	1μF	DC50WV
A6	C519	0276013	Polyester film	0.22μF ±10%	DC50WV
A5	C520	0248676	Ceramic	47pF ±5%	DC50WV
A5	C521	0244171	Ceramic	0.01μF +100% −0%	DC50WV
A5	C522	0248674	Ceramic	39pF ±5%	DC50WV
B6	C523	0275819	Polyester film	0.022μF ±10%	DC50WV
B5	C524	0252615	Electrolytic	4.7μF	DC25WV
B5	C525	0275819	Polyester film	0.022μF ±10%	DC50WV
B7	C531	0252523	Electrolytic	33μF ±10%	DC25WV
B7	C526	0244136	Ceramic	270pF ±10%	DC50WV
A7	C527	0244136	Ceramic	270pF ±10%	DC50WV
A7	C528	0244136	Ceramic	270pF ±10%	DC50WV
B5	C529	0248738	Ceramic	470pF ±10%	DC50WV
E3	C601	0277025	Polyester film	0.1μF ±10%	DC50WV
E3	C602	0277025	Polyester film	0.1μF ±10%	DC50WV
E3	C603	0251087	Electrolytic	1μF ±20%	DC25WV
E3	C604	0277123	Polyester film	0.068μF ±20%	DC50WV
E3	C605	0251090	Electrolytic	10μF ±20%	DC25WV
E3	C606	0251075	Electrolytic	4.7μF ±20%	DC16WV
E3	C607	0252333	Electrolytic	330μF	DC10WV
E4	C608	0275830	Polyester film	2200pF ±20%	DC100WV
E4	C609	0258584	Electrolytic	10μF	DC160WV
E4	C610	0244565	Ceramic	4700pF +100% −0%	DC500WV
E5	C611	0258589	Electrolytic	100μF	DC160WV
E5	C612	0244565	Ceramic	4700pF +100% −0%	DC500WV
D5	C614	0251073	Electrolytic	2.2μF ±20%	DC16WV
E5	C615	0252525	Electrolytic	47μF	DC16WV
E5	C616	0244103	Ceramic	1500pF ±10%	DC50WV
E4	C620	0252525	Electrolytic	47μF	DC16WV
D3	C701	0277013	Polyester film	0.01μF ±10%	DC50WV
D3	C702	0277013	Polyester film	0.01μF ±10%	DC50WV
D3	C703	0277013	Polyester film	0.01μF ±10%	DC50WV
D3	C704	0277017	Polyester film	0.022μF ±10%	DC50WV
D4	C706	0277017	Polyester film	0.022μF ±10%	DC50WV
D4	C707	0252621	Electrolytic	10μF	DC25WV
D4	C708	0252613	Electrolytic	3.3μF	DC25WV
⚠ D4	C709	0299963	Polypropylene	0.01μF ±5%	DC630WV
⚠ D4	C710	0299961	Polypropylene	0.1μF ±5%	DC200WV
D4	C711	0277021	Polyester film	0.047μF ±10%	DC50WV
D4	C712	0277013	Polyester film	0.01μF ±10%	DC50WV
D4	C713	0299914	Polypropylene	0.01μF ±10%	DC200WV
D4	C714	0243512	Ceramic	820pF ±10%	DC500WV
D5	C715	0215296	Paper	0.068μF ±10%	DC1kWV
⚠ D5	C716	0299920	Polypropylene	0.033μF±10%	DC200WV
⚠ D5	C717	0299632	Polypropylene	0.033μF±10%	DC630WV
⚠ D5	C718	0299632	Polypropylene	0.033μF±10%	DC630WV
⚠ D5	C719	0299631	Polypropylene	0.027μF±10%	DC630WV
⚠ D5	C720	0299924	Polypropylene	0.068μF±10%	DC200WV
⚠ D5	C721	0299924	Polypropylene	0.068μF±10%	DC200WV
E5	C722	0279859	Polyester film	0.1μF ±10%	DC100WV
D5	C723	0243505	Ceramic	220pF ±10%	DC500WV
D5	C725	0258589	Electrolytic	100μF	DC160WV
D5	C726	0252532	Electrolytic	220μF	DC16WV
E6	C727	0252536	Electrolytic	1000μF	DC16WV
⚠ D6	C728	0299607	Polypropylene	0.22μF±10%	DC400WV
⚠ D6	C729	0299605	Polypropylene	0.15μF±10%	DC400WV
D6	C730	0257539	Electrolytic	3.3μF	DC200WV
E5	C731	0279859	Polyester film	0.1μF ±10%	DC100WV
D6	C732	0257535	Electrolytic	1μF	DC160WV
D5	C734	0244436	Ceramic	1000pF ±20%	DC1kWV
E7	C735	0277019	Polyester film	0.033μF ±10%	DC50WV
E6	C736	0277007	Polyester film	3300pF ±10%	DC50WV
D5	C737	0243837	Ceramic	330pF ±10%	DC2.5kWV
E7	C740	0252663	Electrolytic	330μF	DC25WV
E7	C741	0252331	Electrolytic	100μF	DC10WV
E5	C742	0244107	Ceramic	3300pF ±10%	DC50WV
⚠ D5	C743	0299920	Polypropylene	0.033μF±10%	DC200WV
D6	C746	0252621	Electrolytic	10μF	DC25WV
D6	C747	0275023	Polyester film	1500pF ±5%	DC50WV
E6	C748	0257536	Electrolytic	3.3μF	DC160WV
E5	C750	0243504	Ceramic	180pF ±10%	DC50WV
C8	C850	0243425	Ceramic	100pF ±10%	DC1.5kWV
⚠ D1	C901	0279723	Polyester film	0.22μF ±20%	DC125WV
⚠ C2	C902	0244541	Ceramic	0.01μF ±10%	DC500WV
E1	C904	0277029	Polyester film	0.22μF ±10%	DC100WV
E2	C905	0257535	Electrolytic	1μF	DC160WV
D2	C906	0277029	Polyester film	0.22μF ±10%	DC100WV
D2	C907	0277029	Polyester film	0.22μF ±10%	DC100WV
D2	C908	0259828	Electrolytic	1000μF	DC160WV
E2	C912	0299926	Polypropylene	0.1μF ±10%	DC200WV
D2	C913	0257523	Electrolytic	2.2μF	DC160WV
E2	C916	0252563	Electrolytic	330μF	DC16WV
D1	C918	0244541	Ceramic	0.01μF ±10%	DC500WV
D2	C919	0257536	Electrolytic	3.3μF	DC160WV

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
RESISTORS					
A3	R001	0114133	Carbon film	120Ω ±5%	SRD¼P
B3	R002	0114207	Carbon film	18kΩ ±5%	SRD¼P
A3	R003	0114181	Carbon film	6.8kΩ ±5%	SRD¼P
A3	R005	0114220	Carbon film	62kΩ ±5%	SRD¼P
A3	R006	0114224	Carbon film	91kΩ ±5%	SRD¼P
B1	R201	0114062	Carbon film	75Ω ±5%	SRD¼P
B1	R202	0114049	Carbon film	22Ω ±5%	SRD¼P
B2	R203	0114015	Carbon film	8.2Ω ±5%	SRD¼P
B2	R205	0114149	Carbon film	560Ω ±5%	SRD¼P
B2	R206	0114138	Carbon film	200Ω ±5%	SRD¼P
B2	R207	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
B2	R208	0114131	Carbon film	100Ω ±5%	SRD¼P
B2	R209	0114149	Carbon film	560Ω ±5%	SRD¼P
B3	R210	0114139	Carbon film	220Ω ±5%	SRD¼P
B3	R211	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
B3	R212	0114131	Carbon film	100Ω ±5%	SRD¼P
B3	R213	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
B3	R214	0114153	Carbon film	820Ω ±5%	SRD¼P
B3	R215	0114137	Carbon film	180Ω ±5%	SRD¼P
B3	R216	0114057	Carbon film	47Ω ±5%	SRD¼P
B3	R217	0114137	Carbon film	180Ω ±5%	SRD¼P
B4	R218	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
B4	R219	0114059	Carbon film	56Ω ±5%	SRD¼P
B4	R220	0114141	Carbon film	270Ω ±5%	SRD¼P
B4	R221	0114176	Carbon film	4.3kΩ ±5%	SRD¼P
B4	R222	0114183	Carbon film	8.2kΩ ±5%	SRD¼P
B4	R223	0114161	Carbon film	1.0kΩ ±5%	SRD¼P
B4	R224	0114207	Carbon film	18kΩ ±5%	SRD¼P
C4	R251	0114217	Carbon film	47kΩ ±5%	SRD¼P
C4	R252	0114209	Carbon film	22kΩ ±5%	SRD¼P
C4	R253	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
C4	R254	0114203	Carbon film	12kΩ ±5%	SRD¼P
C4	R255	0137569	Carbon film	560Ω ±5%	SRD½SD
B4	R256	0114137	Carbon film	180Ω ±5%	SRD¼P
C3	R257	0114205	Carbon film	15kΩ ±5%	SRD¼P
C3	R258	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
C3	R259	0114138	Carbon film	200Ω ±5%	SRD¼P
C3	R260	0114153	Carbon film	820Ω ±5%	SRD¼P
C3	R261	0114183	Carbon film	8.2kΩ ±5%	SRD¼P
C2	R262	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
C2	R263	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
C2	R264	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
C2	R265	0151187	Control	5kΩ-B	AGC
C1	R266	0114167	Carbon film	1.8kΩ ±5%	SRD¼P
C1	R267	0114153	Carbon film	820Ω ±5%	SRD¼P
C1	R268	0114131	Carbon film	100Ω ±5%	SRD¼P
C1	R269	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
C1	R270	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
C3	R274	0114145	Carbon film	390Ω ±5%	SRD¼P
C3	R275	0137569	Carbon film	560Ω ±5%	SRD½SD
C1	R276	0114137	Carbon film	180Ω ±5%	SRD¼P
C5	R301	0114167	Carbon film	1.8kΩ ±5%	SRD¼P
C5	R302	0114143	Carbon film	330Ω ±5%	SRD¼P
C5	R303	0114049	Carbon film	22Ω ±5%	SRD¼P
⚠ C6	R308	0114281	Carbon film	100kΩ ±5%	SRD¼P
C6	R312	0114140	Carbon film	240Ω ±5%	SRD¼P
C6	R313	0114167	Carbon film	1.8kΩ ±5%	SRD¼P
C6	R314	0114169	Carbon film	2.2kΩ ±5%	SRD¼P

PRODUCT SAFETY NOTE – Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
C6	R315	0114041	Carbon film	10Ω ±5%	SRD¼P
C6	R316	0114147	Carbon film	470Ω ±5%	SRD¼P
C6	R317	0114145	Carbon film	390Ω ±5%	SRD¼P
C6	R318	0114057	Carbon film	47Ω ±5%	SRD¼P
C7	R319	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
B5	R321	0114211	Carbon film	27kΩ ±5%	SRD¼P
B5	R322	0114217	Carbon film	47kΩ ±5%	SRD¼P
B6	R323	0114293	Carbon film	330kΩ ±5%	SRD¼P
B6	R324	0114153	Carbon film	820Ω ±5%	SRD¼P
B6	R325	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
C6	R326	0114151	Carbon film	680Ω ±5%	SRD¼P
C5	R327	0134083	Composition	1.2kΩ ±5%	RC½GF
C5	R329	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
C5	R330	0114143	Carbon film	330Ω ±5%	SRD¼P
C5	R331	0114063	Carbon film	82Ω ±5%	SRD¼P
⚠ B6	R332	0151286	Control	500Ω-B	Sub. BRIT
⚠ B6	R333	0159249	Control	500Ω-B	BRIGHT
⚠ C5	R334	0159240	Control	1kΩ-A	CONTRA
C6	R335	0114205	Carbon film	15kΩ ±5%	SRD¼P
C7	R336	0114131	Carbon film	100Ω ±5%	SRD¼P
A3	R401	0114201	Carbon film	10kΩ ±5%	SRD¼P
A3	R402	0114289	Carbon film	220kΩ ±5%	SRD¼P
A4	R403	0114164	Carbon film	1.3kΩ ±5%	SRD¼P
A4	R404	0114055	Carbon film	39Ω ±5%	SRD¼P
A4	R405	0114207	Carbon film	18kΩ ±5%	SRD¼P
A4	R406	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
⚠ A4	R407	0159239	Control	50kΩ-A	VOLUME
A4	R408	0114211	Carbon film	27kΩ ±5%	SRD¼P
B4	R410	0114147	Carbon film	470Ω ±5%	SRD¼P
B4	R411	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
A4	R412	0119507	Metal oxide film	10Ω ±5%	RN¼P
A4	R413	0114217	Carbon film	47kΩ ±5%	SRD¼P
B4	R414	0137559	Carbon film	220Ω ±5%	SRD¼P
A5	R501	0114149	Carbon film	560Ω ±5%	SRD¼P
A5	R508	0114297	Carbon film	470kΩ ±5%	SRD¼P
A5	R509	0114175	Carbon film	3.9kΩ ±5%	SRD¼P
B6	R510	0114183	Carbon film	8.2kΩ ±5%	SRD¼P
B6	R511	0114151	Carbon film	680Ω ±5%	SRD¼P
B6	R512	0114143	Carbon film	330Ω ±5%	SRD¼P
B6	R513	0114147	Carbon film	470Ω ±5%	SRD¼P
B6	R514	0114152	Carbon film	750Ω ±5%	SRD¼P
B6	R514	0114162	Carbon film	1.0kΩ ±5%	SRD¼P
B6	R515	0114147	Carbon film	470Ω ±5%	SRD¼P
B6	R516	0114137	Carbon film	180Ω ±5%	SRD¼P
A6	R518	0114213	Carbon film	33kΩ ±5%	SRD¼P
A6	R519	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
B6	R520	0114147	Carbon film	470Ω ±5%	SRD¼P
A5	R522	0114133	Carbon film	120Ω ±5%	SRD¼P
⚠ A5	R523	0159240	Control	1kΩ-A	TINT
B6	R524	0114211	Carbon film	27kΩ ±5%	SRD¼P
B5	R525	0151187	Control	5kΩ-B	COLOR
B5	R526	0114211	Carbon film	27kΩ ±5%	SRD¼P
B6	R528	0114222	Carbon film	75kΩ ±5%	SRD¼P
B6	R529	0114163	Carbon film	1.2kΩ ±5%	SRD¼P
B7	R530	0114139	Carbon film	220Ω ±5%	SRD¼P
B7	R531	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
A7	R532	0114139	Carbon film	220Ω ±5%	SRD¼P
A7	R533	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
A7	R534	0114139	Carbon film	220Ω ±5%	SRD¼P
A7	R535	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
B5	R537	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
A5	R539	0114143	Carbon film	330Ω ±5%	SRD¼P
※ A5	R540	0114151	Carbon film	680Ω ±5%	SRD¼P

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
※ A5	R541	0114167	Carbon film	1.8kΩ ±5%	SRD¼P
※ A5	R542	0114061	Carbon film	68Ω ±5%	SRD¼P
※ A5	R550	0114131	Carbon film	100Ω ±5%	SRD¼P
⚠ A7	R544	0159276	Control	10kΩ-B	COLOR
A7	R545	0151264	Control	10kΩ-B	Sub.COL
D3	R601	0114175	Carbon film	3.9kΩ ±5%	SRD¼P
E3	R602	0114173	Carbon film	3.3kΩ ±5%	SRD¼P
E3	R603	0114215	Carbon film	39kΩ ±5%	SRD¼P
E3	R604	0114171	Carbon film	2.7kΩ ±5%	SRD¼P
⚠ E3	R605	0151254	Control	5kΩ-B	Sub. V. HOLD
E3	R606	0114207	Carbon film	18kΩ ±5%	SRD¼P
⚠ E3	R607	0159239	Control	50kΩ-A	V.HOLD
E3	R608	0114201	Carbon film	10kΩ ±5%	SRD¼P
E3	R609	0114183	Carbon film	8.2kΩ ±5%	SRD¼P
E3	R610	0151255	Control	20kΩ-B	V.LIN
E3	R611	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
⚠ E4	R612	0151254	Control	5kΩ-B	V.SIZE
E4	R613	0114183	Carbon film	8.2kΩ ±5%	SRD¼P
E4	R614	0114175	Carbon film	3.9kΩ ±5%	SRD¼P
⚠ E4	R616	0110125	Metal oxide film	150Ω ±5%	RD1PB
E4	R617	0114147	Carbon film	470Ω ±5%	SRD¼P
E4	R618	0114209	Carbon film	22kΩ ±5%	SRD¼P
E4	R619	0114049	Carbon film	22Ω ±5%	SRD¼P
E4	R620	0114051	Carbon film	27Ω ±5%	SRD¼P
E4	R621	0114139	Carbon film	220Ω ±5%	SRD¼P
E4	R622	0110157	Metal oxide film	3.3kΩ ±5%	RD1PB
E4	R623	0110157	Metal oxide film	3.3kΩ ±5%	RD1PB
E4	R624	0114135	Carbon film	150Ω ±5%	SRD¼P
E4	R625	0134017	Composition	10Ω ±5%	RC½GF
E4	R626	0134024	Composition	22Ω ±5%	RC½GF
E5	R627	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
D5	R628	0114141	Carbon film	270Ω ±5%	SRD¼P
D5	R629	0114181	Carbon film	6.8kΩ ±5%	SRD¼P
E5	R630	0114221	Carbon film	68kΩ ±5%	SRD¼P
E5	R631	0114223	Carbon film	82kΩ ±5%	SRD¼P
D5	R632	0114203	Carbon film	12kΩ ±5%	SRD¼P
E4	R633	0114001	Carbon film	2.2Ω ±5%	SRD¼P
⚠ E6	R634	0119508	Metal oxide film	56Ω ±5%	RN¼P
E7	R635	0114175	Carbon film	3.9kΩ ±5%	SRD¼P
⚠ E4	R636	0119507	Metal oxide film	10Ω ±5%	RN¼P
⚠ E6	R637	0110151	Metal oxide film	1.8kΩ ±5%	RD1PB
E5	R638	0151254	Control	5kΩ-B	
D3	R701	0114205	Carbon film	15kΩ ±5%	SRD¼P
D3	R702	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
D3	R703	0114147	Carbon film	470Ω ±5%	SRD¼P
D3	R704	0114203	Carbon film	12kΩ ±5%	SRD¼P
D3	R705	0114203	Carbon film	12kΩ ±5%	SRD¼P
D3	R706	0114145	Carbon film	390Ω ±5%	SRD¼P
D3	R707	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
D3	R708	0114177	Carbon film	4.7kΩ ±5%	SRD¼P
D4	R709	0134103	Composition	8.2kΩ ±5%	RC½GF
⚠ D4	R710	0114151	Carbon film	680Ω ±5%	SRD¼P
⚠ D4	R711	0114179	Carbon film	5.6kΩ ±5%	SRD¼P
D4	R712	0114221	Carbon film	68kΩ ±5%	SRD¼P
⚠ D4	R713	0110173	Metal oxide film	15kΩ ±5%	RD1PB
D4	R714	0114053	Carbon film	33Ω ±5%	SRD¼P
D4	R715	0114147	Carbon film	470Ω ±5%	SRD¼P
D4	R716	0114151	Carbon film	680Ω ±5%	SRD¼P
D4	R717	0114145	Carbon film	390Ω ±5%	SRD¼P
D4	R718	0114175	Carbon film	3.9kΩ ±5%	SRD¼P
⚠ D4	R719	0110359	Metal oxide film	3.9kΩ ±5%	RD3PB
D4	R720	0114057	Carbon film	47Ω ±5%	SRD¼P
D4	R721	0134093	Composition	3.3kΩ ±5%	RC½GF
⚠ D5	R722	0110151	Metal oxide film	1.8kΩ ±5%	RD2PB

PRODUCT SAFETY NOTE – Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
E6	R723	0114139	Carbon film	220Ω ±5%	SRD¼P
E5	R724	0114165	Carbon film	1.5kΩ ±5%	SRD¼P
E5	R725	0114283	Carbon film	120kΩ ±5%	SRD¼P
E5	R726	0114217	Carbon film	47kΩ ±5%	SRD¼P
E5	R727	0114181	Carbon film	6.8kΩ ±5%	SRD¼P
⚠ D5	R729	0119505	Metal oxide film	2.2Ω ±5%	RN¼P
⚠ E5	R730	0114281	Carbon film	100kΩ ±5%	SRD¼P
E5	R731	0110175	Metal oxide film	18kΩ ±5%	RD1PB
⚠ E6	R732	0119504	Metal oxide film	0.5Ω ±5%	RN¼P
⚠ D6	R733	0119505	Metal oxide film	2.2Ω ±5%	RN¼P
⚠ D6	R734	0190022	Wire wound	4.7Ω ±10%	RG2P
D6	R735	0110129	Metal oxide film	270Ω ±5%	RD1PB
D5	R736	0119504	Metal oxide film	0.5Ω ±5%	RN¼P
⚠ E7	R740	0119505	Metal oxide film	2.2Ω ±5%	RN¼P
⚠ D6	R741	0119505	Metal oxide film	2.2Ω ±5%	RN¼P
⚠ E6	R742	0119505	Metal oxide film	2.2Ω ±5%	RN¼P
D6	R748	0114133	Carbon film	120Ω ±5%	SRD¼P
⚠ D6	R749	0134202	Composition	1MΩ ±5%	RC½GF
⚠ E7	R751	0153251	Control	15MΩ ±10%	FOCUS
⚠ E7	R752	0134409	Composition	1MΩ ±10%	RC½GF
C7	R850	0114139	Carbon film	220Ω ±5%	SRD¼P
C8	R851	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
C8	R852	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
⚠ C8	R853	0151288	Control	2kΩ-B	RV-16
C8	R854	0114135	Carbon film	150Ω ±5%	SRD¼P
C8	R855	0114141	Carbon film	270Ω ±5%	SRD¼P
⚠ C8	R856	0151286	Control	500Ω-B	RV-16
C8	R857	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
C8	R858	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
⚠ C8	R859	0151288	Control	2kΩ-B	RV-16
C7	R860	0114135	Carbon film	150Ω ±5%	SRD¼P
C7	R861	0114141	Carbon film	270Ω ±5%	SRD¼P
⚠ C7	R862	0151286	Control	500Ω-B	RV-16
C7	R863	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
C8	R864	0114169	Carbon film	2.2kΩ ±5%	SRD¼P
⚠ C8	R865	0151288	Control	2kΩ-B	RV-16
B8	R867	0134099	Composition	5.6kΩ ±5%	RC½GF
B8	R868	0134091	Composition	2.7kΩ ±5%	RC½GF
B7	R869	0134091	Composition	2.7kΩ ±5%	RC½GF
C8	R870	0134177	Composition	470kΩ ±5%	RC½GF
⚠ C8	R871	0153223	Control	1MΩ-B	RV-24
C8	R872	0134181	Composition	680kΩ ±5%	RC½GF
C8	R873	0134177	Composition	470kΩ ±5%	RC½GF
A7	R874	0134169	Composition	220kΩ ±5%	RC½GF
A8	R875	0134161	Composition	100kΩ ±5%	RC½GF
B7	R876	0110271	Metal oxide film	12kΩ ±5%	RD2PB
B8	R877	0110271	Metal oxide film	12kΩ ±5%	RD2PB
B7	R878	0110271	Metal oxide film	12kΩ ±5%	RD2PB
⚠ D1	R901	0139007	Composition	1MΩ ±10%	RC½GF
⚠ D1	R902	0139007	Composition	1MΩ ±10%	RC½GF
⚠ E1	R903	0142261	Wire wound	2.7Ω ±5%	RWH20
E1	R904	0114168	Carbon film	2kΩ ±5%	SRD¼P
D2	R906	0114164	Carbon film	1.3kΩ ±5%	SRD¼P
D2	R907	0114281	Carbon film	100kΩ ±5%	SRD¼P
D2	R908	0114180	Carbon film	6.2kΩ ±5%	SRD¼P
D2	R909	0114281	Carbon film	100kΩ ±5%	SRD¼P
D2	R910	0114215	Carbon film	39kΩ ±5%	SRD¼P
D2	R912	0114164	Carbon film	1.3kΩ ±5%	SRD¼P
D2	R913	0114218	Carbon film	5.1kΩ ±5%	SRD¼P
⚠ E2	R916	0110145	Carbon film	1kΩ ±5%	RD1PB

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION		
⚠ D2	R917	0110271	Metal oxide film	12kΩ ±5%	RD2PB
E2	R921	0114281	Carbon film	100kΩ ±5%	SRD¼P
D2	R925	0114281	Carbon film	100kΩ ±5%	SRD¼P
D2	R926	0114281	Carbon film	100kΩ ±5%	SRD¼P
D2	R927	0114161	Carbon film	1kΩ ±5%	SRD¼P
E2	R928	0137611	Carbon film	2.7kΩ ±5%	SRD½SD
⚠ E2	R929	0134129	Composition	22kΩ ±5%	RC½GF
⚠ E3	R930	0114223	Carbon film	82kΩ ±5%	SRD¼P
SEMICONDUCTORS					
B2	TR201	0573474	Silicon	2SC682 Ⓐ	
B3	TR202	0573474	Silicon	2SC682 Ⓐ	
B3	TR203	2320141	Silicon	2SC717	
C4	TR251	2320591	Silicon	2SC458 Ⓑ/Ⓒ	
C3	TR252	2320631	Silicon	2SA673 Ⓑ/Ⓒ	
C3	TR253	2320631	Silicon	2SA673 Ⓒ/Ⓓ	
C2	TR254	2320591	Silicon	2SC458 Ⓑ/Ⓒ	
C5	TR301	2320596	Silicon	2SC458 Ⓒ/Ⓓ	
B6	TR302	2320596	Silicon	2SC458 Ⓑ/Ⓒ/Ⓓ	
C6	TR303	2321351	Silicon	2SA844 Ⓓ/Ⓔ, 2SA836 Ⓓ/Ⓔ	
C7	TR304	2320637	Silicon	2SA673 Ⓒ/Ⓓ	
E3	TR601	2320591	Silicon	2SC458 Ⓑ/Ⓒ	
E4	TR602	2320631	Silicon	2SA673 Ⓑ/Ⓒ	
E4	TR603	2321221	Silicon	2SC1514	
⚠ E4	TR604	2321592	Silicon	2SD401A Ⓚ/Ⓛ	
⚠ E4	TR605	2321386	Silicon	2SB546 Ⓚ/Ⓛ 2SB546A Ⓚ/Ⓛ	
D3	TR701	2320591	Silicon	2SC458 Ⓑ/Ⓒ	
⚠ D4	TR702	2321321	Silicon	2SA844 Ⓓ/Ⓔ	
⚠ D4	TR703	2321412	Silicon	2SC1722BK	
⚠ D5	TR704	2320299	Silicon	2SC937 YL/BK	
⚠ E6	TR705	2320845	Silicon	2SC1162WT Ⓒ/Ⓓ	
E5	TR706	2320591	Silicon	2SC458 Ⓑ/Ⓒ	
D5	TR707	2320647	Silicon	2SC1213 Ⓒ/Ⓓ	
⚠ D6	TR708	2390022	Silicon	M21C (Y)	
⚠ B7	TR851	2321221	Silicon	2SC1514	
⚠ B8	TR852	2321221	Silicon	2SC1514	
⚠ B7	TR853	2321221	Silicon	2SC1514	
⚠ E2	TR901	2321264	Silicon	CU12E	
⚠ D2	TR903	2321322	Silicon	2SA844 Ⓔ	
⚠ D2	TR904	2321322	Silicon	2SA844 Ⓔ	
⚠ E2	TR905	2321591	Silicon	2SD401A Ⓚ	
⚠ D2	TR907	2321521	Silicon	2SA872A Ⓔ/Ⓕ	
B4	CR201	0575005	Germanium	IN60	
C4	CR251	0575005	Germanium	IN60	
C4	CR252	2331351	Silicon	IS2076/IS2473H	
C4	CR253	2331351	Silicon	IS2076/IS2473H	
C2	CR254	0575001	Germanium	IN34A	
C2	CR255	0575001	Germanium	IN34A	
C1	CR256	0575001	Germanium	IN34A	
C6	CR301	2331351	Silicon	IS2076/IS2473H	
C5	CR302	2331351	Silicon	IS2076/IS2473H	
C6	CR303	2331351	Silicon	IS2076/IS2473H	
C6	CR304	2331161	Silicon	HZ-11 Ⓐ/Ⓑ/Ⓒ	
C6	CR305	2331351	Silicon	IS2076/IS2473H	
C7	CR306	2331161	Silicon	HZ-11 Ⓐ/Ⓑ/Ⓒ	
C7	CR307	2331351	Silicon	IS2076/IS2473H	
C7	CR308	0575005	Germanium	IN60	
A3	CR401	0575005	Germanium	IN60	
A3	CR402	2330631	Silicon	HZ-7A	

PRODUCT SAFETY NOTE – Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION	
A7	CR501	2331351	Silicon	IS2076/IS2473H
B7	CR502	2331351	Silicon	IS2076/IS2473H
A7	CR503	2331351	Silicon	IS2076/IS2473H
A7	CR505	2331351	Silicon	IS2076/IS2473H
B7	CR506	2331351	Silicon	IS2076/IS2473H
A7	CR507	2331351	Silicon	IS2076/IS2473H
E5	CR601	2330351	Silicon	IS2076
E4	CR602	2330307	Silicon	AW01-08
E6	CR603	2330251	Silicon	VO6C
D3	CR701	0575001	Germanium	IN34A
D3	CR702	0575001	Germanium	IN34A
⚠ D5	CR703	2330564	Silicon	V11N
⚠ D5	CR704	2330191	Silicon	SB-2C
E5	CR705	2330351	Silicon	IS2076
⚠ E4	CR706	2330551	Silicon	VO9C
⚠ E5	CR707	2331152	Silicon	HZ-12 Ⓑ
⚠ D6	CR708	2330551	Silicon	VO9C
⚠ E7	CR709	2330551	Silicon	VO9C
E6	CR710	2330551	Silicon	VO9C
⚠ E7	CR711	2330551	Silicon	VO9C
⚠ E6	CR714	2330551	Silicon	VO9C
⚠ D2	CR901	2330773	Silicon	UO5G
D2	CR902	2330351	Silicon	IS2076
D2	CR905	2330351	Silicon	IS2076
⚠ E2	CR906	2330252	Silicon	VO6E
E2	CR908	233025*	Silicon	VO6C
⚠ D3	CR910	2330251	Silicon	VO6C
D2	CR912	2330251	Silicon	VO6C
C1	TH251	2340371	Thermistor	112301-9
E4	TH601	2340351	Thermistor	112351-2
E6	TH602	2340341	Thermistor	11D4H
⚠ D1	TH901	2340263	Thermistor	PTC thermistor
ICs				
A3	IC001	2360511	HA1126DW	
A4	IC401	2360291	KC583C	
A6	IC501	2360431	KC580C/HA11580	
MODULES				
⚠ D6	M701	2370152	HM7101HD	
⚠ D3	M901	2370141	HM9101VS-1	
TRANSFORMERS				
A2	T001	2141081	AFC tuning transformer	
B2	T201	2141144	IFT 58MHz	
B3	T202	2140143	IFT 58MHz	
B4	T203	2141355	M10X type of transformer	
B4	T204	2141354	M10X type of transformer	
B4	T401	2141372	Ratio Det. transformer	
※ B4	T402	2250321	Sound output transformer	
A5	T501	2141533	Band pass transformer	
⚠ D4	T701	2161342	H. OSC transformer	
⚠ D4	T702	2260021	H. drive transformer	
⚠ D6	T703	2270491	Pincushion-H ASS	
⚠ D6	T704	2431521	Flyback transformer	
COILS				
A3	L001	2121203	Filter coil	83MHz
A3	L002	2141455	Mold IFT	
A3	L003	2121203	Filter coil	83MHz

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION	
B1	L201	2140885	Mold IFT	
B1	L202	2140885	Mold IFT	
B4	L206	2141454	Mold IFT	
B4	L207	2141562	Fixed inductor	1.8μH
B5	L209	2121204	Filter coil	45MHz
B4	L210	2121203	Filter coil	83MHz
B5	L211	2141544	Trap coil	4.5MHz
C6	L301	2121304	Peaking	1.8μH
C6	L303	2121699	Peaking	39μH
C6	L305	2121702	Peaking	56μH
C7	L306	2121221	Peaking	2.2μH
※ C1	L307	2120251	Peaking coil	
C5	L308	2120482	Filter coil	100μH
B3	L401	2121693	Peaking	12μH
B3	L402	2121203	Filter coil	83MHz
B3	L403	2121204	Filter coil	45MHz
B3	L404	2121698	Peaking	33μH
A3	L405	2121203	Filter coil	83MHz
A5	L501	2141531	Band pass coil	
B6	L502	2121706	Peaking	100μH
A5	L504	2121692	Peaking	10μH
B5	L505	2160831	Fixed coil	15mH
B6	L506	2120231	Peaking	5.6μH
D4	L701	2120483	Filter coil	390μH
D4	L702	2120811	Filter coil	10μH
D6	L703	2120486	Filter coil	4.7mH
D7	L704	2120811	Filter coil	10μH
E6	L705	2120482	Filter coil	100μH
D5	L707	2120333	HFC (heater choke)	0.35μH
B7	L851	2121708	Peaking	120μH
⚠ D1	L901	2121673	Line filter coil	
⚠ E1	L902	2121811	Filter coil	0.26mH
⚠ C1	L903	2161487	Degaussing coil	
COMPOUND COMPONENTS				
⚠ A1	CP051	2790161	Capristor	
⚠ A1	CP052	2790161	Capristor	
⚠ A1	CP053	2790162	Capristor	
⚠ A1	CP054	2790162	Capristor	
B2	CP201	2141714	Compound trap coil	47.25MHz
B2	CP202	2141715	Compound trap coil	41.25MHz
B2	CP203	2141716	Compound trap coil	39.75MHz
C5	CP301	2121571	Compound trap coil	3.58MHz
MISCELLANEOUS				
		2750011	Antenna telescopic antenna	
		2750051	Antenna-Loop antenna	
⚠		2685772	Antenna terminal board assembly (CANADA)	
⚠		2683952	Antenna terminal board assembly (USA)	
		2507002	Board-Signal P.W. board (CR-316)	
		2507003	Board-Signal P.W. board (CR-320)	
		2507022	Board-Power/Def. P.W. board	
		2507511	Board-C.P.T P.W. board (CR-316)	
		2507513	Board-C.P.T P.W. board (CR-320)	
	CF401	2140631	Ceramic filter	
	X501	2783071	Crystal	
		2771382	C-F magnet	
⚠		2742271	Coad-AC line coad	
		3158591	Cover-Back cover assembly (USA)	
		3158704	Cover-Back cover assembly (CANADA)	

PRODUCT SAFETY NOTE – Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

PLACE	SYMBOL NO.	STOCK NO.	DESCRIPTION
		2730063	Earphone (CR-320)
⚠	J451	2670671	Earphone jack (CR-320)
⚠	F901	2720058	Fuse 4A (UL)
		3218351	Front frame assembly (CR-316)
		3218352	Front frame assembly (CR-320, USA)
		3218353	Front frame assembly (CR-320, CANADA)
		3258331	Knob-Auto (CR-316)
		3256972	Knob-Auto (CR-320)
		3257303	Knob-Volume (CR-316)
		3257303	Knob-Tint, Color, Bright, contrast (CR-316)
		3256605	Knob-Tint, Color, Bright, contrast (CR-320)
		3258242	Knob-VHF cahnnel selector (CR-316)
		3258241	Knob-VHF cahnnel selector (CR-320)
		3258051	Knob-VHF preset fine tuning
		3258222	Knob-UHF cahnnel selector (CR-316)
		3258221	Knob-UHF channel selector (CR-320)
		3257122	Knob-V. hold
		3256992	Knob-Pull switch
		3258191	Knob-UHF indicator A
		3258181	Knob-UHF indicator B
⚠	NE851	2340181	Lamp-Neon lamp
⚠	NE852	2340181	Lamp-Neon lamp
⚠	NE853	2340181	Lamp-Neon lamp
	S050	2630771	Switch-Push switch
⚠	S901	2630833	Switch-ON/OFF switch
	SP451	2410421	Speaker 80 x 120mm
⚠	SG850	2340032	Spark gap
⚠	SG851	2340032	Spark gap
⚠	SG852	2340032	Spark gap
⚠	SG853	2340032	Spark gap
		2654542	Socket-C.P.T socket
⚠	V1	2351071	Tube-C.P.T 370CFB22
⚠		2422262	Tuner-VHF tuner HT-354J
⚠		2421535	Tuner-UHF tuner HU-354C
⚠		2440792	Yoke-Deflection yoke
		4613543	Wedge
		9413926	Silicon gum for wedge
		4782841	Tape for wedge
		4761722	Operating guide book (CR-320, USA)
		4761723	Operating guide book (CR-320, CANADA)
		4761724	Operating guide book (CR-316, USA)
		4761725	Operating guide book (CR-316, CANADA)
⚠		2760404	Lamp-Color lok (CR-320)

HITACHI

HITACHI SALES CORPORATION OF AMERICA

NATIONAL HEADQUARTERS OFFICE:	401 West Artesia Blvd., Compton Calif. 90220	Tel. 213-537-8383
Western Regional Office:	401 West Artesia Blvd., Compton Calif. 90220	Tel. 213-537-8383
Eastern Regional Office:	48-50 34th St., Long Island City, N.Y. 11101	Tel. 212-361-3090
Mid-Western Regional Office:	1400 Morse Ave., Elk Grove Village Chicago, Ill. 60067	Tel. 312-593-1550
South-Western REgional Office:	World Trade Center #183, 2050 Stemmons Freeway, Dallas, Texas 75207	Tel. 214-747-3547

HITACHI SALES CORPORATION OF HAWAII, INC.

743-G Waiakamilo Rd., Honolulu, Hawaii 96817 Tel. 841-0431

HITACHI SALES CORPORATION DE PANAMA, S.A.

Apartado 7657, Panama 5, Calle Ramon Arias Y Calle B, Edificio Brasil 100, Nuevo Reparto el Carmen, Republic de Panama Tel. 61-3100

HITACHI SALES CORPORATION OF CANADA LTD.

3300 Route Trans Canada, Pointe Claire, Qué. H9R 1B1 Tel. 514-697-9150

CR-316 (511, 501)
CR-320 (511, 501)

Printed in Japan NR-R(P)